



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

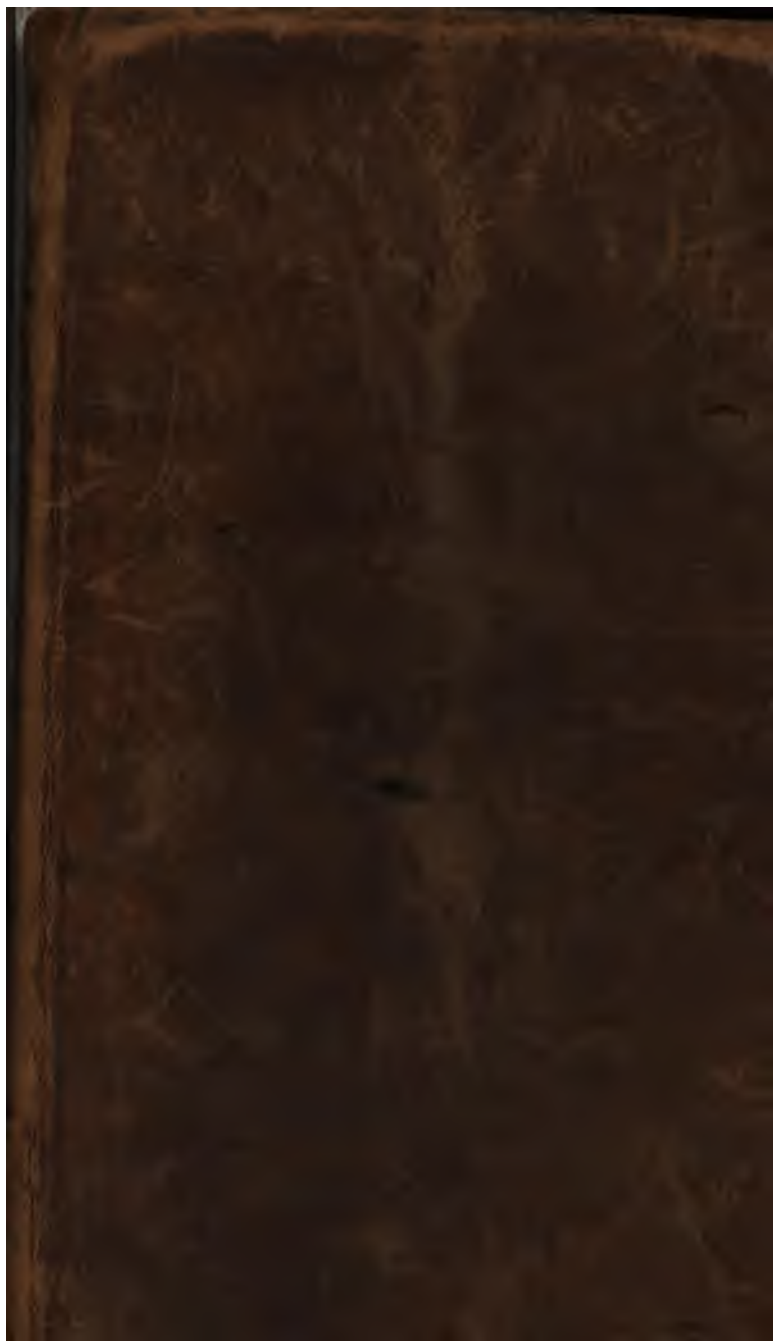
We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>







3 2044 096 993 225

Wm

May E Dewing
No 16 Harbor St
Salem
Mass

Jessie

HARVARD COLLEGE
LIBRARY

Ms. A. 9. 2. 1

• ARITHMETIC

UPON THE

INDUCTIVE METHOD OF INSTRUCTION.

BEING

A SEQUEL

TO

INTELLECTUAL ARITHMETIC.

—∞—
BY WARREN COLBURN, A. M.



BOSTON:
PUBLISHED BY HILLIARD, GRAY & CO.

1837.

Educ T 118 37 298

HARVARD COLLEGE LIBRARY

GEO. L. F.

GEORGE A. W. PLIMPTON

JANUARY 25, 1924

DISTRICT OF MASSACHUSETTS, TO WIT :

District Clerk's Office.

BE IT REMEMBERED, that on the twenty-fifth day of May, A. D. 1826, and in the fiftieth year of the Independence of the United States of America, Warren Colburn, of the said District, has deposited in this office the title of a book, the right whereof he claims as author, in the words following, to wit :

"Arithmetic upon the Inductive Method of Instruction : being a Sequel to Intellectual Arithmetic. By Warren Colburn, A. M."

In conformity to the Act of the Congress of the United States, entitled, "An act for the encouragement of learning, by securing the copies of maps, charts, and books, to the authors and proprietors of such copies, during the times therein mentioned ;" and also an act, entitled, "An act supplementary to an act, entitled, An act for the encouragement of learning, by securing the copies of maps, charts, and books, to the authors and proprietors of such copies, during the times therein mentioned ; and extending the benefits thereof to the arts of designing, engraving, and etching, historical and other prints."

JNO. W. DAVIS,
Clerk of the District of Massachusetts.

Charlotte D. Bailey
RECOMMENDATIONS.
Charlotte D.

From B. A. GOULD, Principal of the Public Latin School, Boston

Boston, 22d Oct., 1822.

DEAR SIR,

I have been highly gratified by the examination of the second part of your Arithmetic. The principles of the science are unfolded, and its practical uses explained with great perspicuity and simplicity. I think your reasonings and illustrations are peculiarly happy and original. This, together with your "First Lessons," forms the most lucid and intelligible, as well as the most scientific system of Arithmetic I have ever seen.—Its own merits place it beyond the need of commendation.

With much esteem,

Sir, your obedient servant,

B. A. GOULD.

MR. WARREN COLBURN.

**From G. B. EMERSON, Principal of the English Classical School,
Boston.**

Boston, 22d Oct., 1822.

DEAR SIR,

I have carefully examined a large portion of your manuscript, and do not hesitate to recommend it very highly to every person who wishes to teach arithmetic intelligibly. The arrangement is very much better, the explanations more convincing, and the rules, from the mode in which they are introduced, are clearer and simpler, than can be found in any book on the subject with which I am acquainted

I am, with great respect,

Yours, &c.

G. B. EMERSON.

MR. WARREN COLBURN.

PREFACE



It will be extremely useful, though not absolutely necessary, for pupils of every age to study the "First Lessons," previous to commencing this treatise. There is an intimate connexion between the two, though this is not dependent on the other. It is hoped that this will be found less difficult than other treatises on the subject, for those who have not studied the "First Lessons."

Pupils may commence the "First Lessons" to advantage, as soon as they can read the examples; and even before they can read, it will be found very useful to ask them questions from it. This may be done by other pupils who have already studied it. Those who commence early, may generally obtain sufficient knowledge of it by the time they are eight or nine years old. They may then commence this.

This Sequel consists of two parts. The first contains a course of examples for the illustration and application of the principles. The second part contains a developement of the principles. The articles are numbered in the two, so as to correspond with each other. The two parts are to be studied together, when the pupil is old enough to comprehend the second part by reading it himself. When he has performed all the examples in an article in the first part, he should be required to recite the corresponding article in the second part, not verbatim, but to give a good account of the reasoning. When the principle is well understood, the rules which are printed in *Italics* should be committed to memory. At each recitation, the first thing should be to require the pupil to give a practical example, involving the principle to be explained, and then an explanation of the principle itself.

When the pupil is to learn the use of figures for the first time, it is best to explain to him the nature of them as in Art. I., to about three or four places; and then require him to write some numbers. Then give him some of the first examples in Art. II., without telling him what to do. He will discover what is to be done, and invent a way to do it. Let him perform several in his own way, and then suggest some method a little different from his, and nearer the common

method. If he readily comprehends it, he will be pleased with it, and adopt it. If he does not, his mind is not yet prepared for it, and should be allowed to continue his own way longer, and then it should be suggested again. After he is familiar with that, suggest another method, somewhat nearer the common method, and so on, until he learns the best method. Never urge him to adopt any method until he understands it, and is pleased with it. In some of the articles, it may perhaps be necessary for young pupils to perform more examples than are given in the book.

When the pupil is to commence multiplication, give him one of the first examples in Art. III., as if it were an example in Addition. He will write it down as such. But if he is familiar with the "First Lessons," he will probably perform it as multiplication without knowing it. When he does this, suggest to him, that he need not write the number but once. Afterwards recommend to him to write a number, to show how many times he repeated it, lest he should forget it. Then tell him that it is Multiplication. Proceed in a similar manner with the other rules.

One general maxim to be observed with pupils of every age, is never to tell them directly how to perform any example. If a pupil is unable to perform an example, it is generally because he does not fully comprehend the object of it. The object should be explained, and some questions asked, which will have a tendency to recall the principles necessary. If this does not succeed, his mind is not prepared for it, and he must be required to examine it more by himself, and to review some of the principles which it involves. It is useless for him to perform it before his mind is prepared for it. After he has been told, he is satisfied, and will not be willing to examine the principle, and he will be no better prepared for another case of the same kind, than he was before. When the pupil knows that he is not to be told, he learns to depend on himself: and when he once contracts the habit of understanding what he does, he will not easily be prevailed on to do any thing which he does not understand.

Several considerations induce the author to think, that when a principle is to be taught, practical questions should first be proposed, care being taken to select such as will show the combination in the simplest manner, and that the numbers be so small that the operation shall not be difficult. When a proper idea is formed of the nature and use of the combination, the method of solving these questions with large numbers should be attended to. This method, on trial has succeeded beyond his expectations. Practical examples not only show at once the object to be accomplished, but they greatly assist

the imagination in unfolding the principle and discovering the operations requisite for the solution.

This principle is made the basis of this treatise; viz. whenever a new combination is introduced, it is done with practical examples, proposed in such a manner as to show what it is, and as much as possible, how it is to be performed. The examples are so small that the pupil may easily reason upon them, and that there will be no difficulty in the operation itself, until the combination is well understood. In this way it is believed that the leading idea which the pupil will obtain of each combination, will be the effect which will be produced by it, rather than how to perform it, though the latter will be sufficiently well understood.

The second part contains an analytical developement of the principles. Almost all the examples used for this purpose are practical. Care has been taken to make every principle depend as little as possible upon others. Young persons cannot well follow a course of reasoning where one principle is built upon another. Besides, a principle is always less understood by every one, in proportion as it is made to depend on others.

In tracing the principles, several distinctions have been made which have not generally been made. They are principally in division of whole numbers, and in division of whole numbers by fractions, and fractions by fractions. There are some instances also of combinations being classed together, which others have kept separate.

As the purpose is to give the learner a knowledge of the principles, it is necessary to have the variety of examples under each principle as great as possible. The usual method of arrangement, according to subjects, has been on this account entirely rejected, and the arrangement has been made according to principles. Many different subjects come under the same principle; and different parts of the same subject frequently come under different principles. When the principles are well understood, very few subjects will require a particular rule, and if the pupil is properly introduced to them, he will understand them better without a rule than with one. Besides, he will be better prepared for the cases which occur in business, as he will be obliged to meet them there without a name. The different subjects, as they are generally arranged, often embarrass the learner. When he meets with a name with which he is not acquainted, and a rule attached to it, he is frequently at a loss, when if he saw the example without the name, he would not hesitate at all.

The manner of performing examples will appear new to many, but it will be found much more agreeable to the practice of men of busi-

ness, and men of science generally, than those commonly found in books. This is the method of those that understand the subject. The others were invented as a substitute for understanding.

The *rule of three* is entirely omitted. This has been considered useless in France, for some years, though it has been retained in their books. Those who understand the principles sufficiently to comprehend the nature of the rule of three, can do much better without it than with it, for when it is used, it obscures, rather than illustrates, the subject to which it is applied. The principle of the rule of three is similar to the combinations in Art. XVI.

The rule of Position has been omitted. This is an artificial rule, the principle of which cannot be well understood without the aid of Algebra: and when Algebra is understood, Position is useless. Besides, all the examples which can be performed by Position, may be performed much more easily, and in a manner perfectly intelligible, without it. The manner in which they are performed is similar to that of Algebra, but without Algebraic notation. The principle of *false position*, properly so called, is applied only to questions where there are not sufficient data to solve them directly.

Powers and roots, though arithmetical operations, come more properly within the province of Algebra.

There are no answers to the examples given in the book. A key is published separately for teachers, containing the answers and solutions of the most difficult examples.

TABLE OF CONTENTS.

(This Table equally refers to Parts I. and II.)

- I. Numeration and Notation.
- II. Addition.
- III. Multiplication, when the multiplier is a single figure.
- IV. Compound numbers, factors, and multiplication, when the multiplier is a compound number.
- V. Multiplication, when the multiplier is 10, 100, 1000, &c.
- VI. Do. ' when the multiplier is 20, 300, &c.
- VII. Do. when the multiplier consists of any number of figures.
- VIII. Subtraction.
- IX. Division, to find how many times one number is contained in another.
- X. Division. Explanation of Fractions. Their Notation. What is to be done with the remainder after division.
- XI. Division, when the divisor is 10, 100, &c.
- XII. To find what part of one number another is, or to find the ratio of one number to another.
- XIII. To change an improper fraction to a whole or mixed number.
- XIV. To change a whole or mixed number to an improper fraction.
- XV. To multiply a fraction by a whole number, by multiplying the numerator.
- XVI. Division, to divide a number into parts. To multiply a whole number by a fraction.
- XVII. To divide a fraction by a whole number. To multiply a fraction by a fraction.
- XVIII. To multiply a fraction by dividing the denominator. Two ways to multiply, and two ways to divide, a fraction.
- XIX. Addition and subtraction of fractions. To reduce them to a common denominator. To reduce them to lower terms

- XX.** Contractions in division.
- XXI.** How to find the divisors of numbers. To find the greatest common divisor of two or more numbers. To reduce fractions to their lowest terms.
- XXII.** To find the least common multiple of two or more numbers.
To reduce fractions to the least common denominator.
- XXIII.** To divide a whole number by a fraction, or a fraction by a fraction, when the purpose is to find how many times the divisor is contained in the dividend. To find the ratio of a fraction and a whole number, or of two fractions.
- XXIV.** To divide a whole number by a fraction, or a fraction by a fraction; a part of a number being given to find the whole. This is on the same principle as that of dividing a number into parts.
- XXV.** Decimal Fractions. Numeration and notation of them.
- XXVI.** Addition and Subtraction of Decimals. To change a common fraction to a decimal.
- XXVII.** Multiplication of Decimals.
- XXVIII.** Division of Decimals.
- XXIX.** Circulating Decimals.
Proof of multiplication and division by casting out 9.

INDEX TO PARTICULAR SUBJECTS.

Compound	Multiplication	{	Miscellaneous examples	Page.	Example.
	Addition			37	1....49
	Subtraction				
	Division				
			Miscellaneous examples	211	1....25
Interest, Simple	{	}	28	43....50
Commission				92	65..113
Insurance				104	43....74
Duties and Premiums					
Discount, Common					
Compound Interest				215	58....68
Discount				{ 78	130..142
				224	110..113
Barter				{ 36	102..106
				42	34....38
Loss and Gain				{ 103	33....41
				214	52....57
Fellowship, Simple				{ 58	158..166
				220	85....86
Fellowship, Compound				221	87....92
Equation of Payments				222	103..109
Alligation Medial				218	69....72
Alligation Alternate				218	73....84
Square and Cubic Measure.	{	}	Miscellaneous Examples	79	1....49
				91	56....64
				101	13....26
Duodecimals				229	141..144
Taxes				103	28....32
Measure of circles, parallelograms, triangles, &c				233	181..187
Geographical and Astronomical questions				234	188..198
Exchange				235	199..205
Tables of Coin, Weights, and Measures				236	
Reflections on Mathematical reasoning				240	

ARITHMETIC.



PART I.



ADDITION.

THE student may perform the following examples in his mind.

1. James has 3 cents and Charles has 5 ; how many have they both ? 8

2. Charles bought 3 bunnys for 16 cents, a quart of cherries for 8 cents, and 2 oranges for 12 cents ; how many cents did he lay out ? 36

3. A man bought a hat for 8 dollars, a coat for 27 dollars, a pair of boots for 5 dollars, and a vest for 7 dollars ; how many dollars did the whole come to ? 47

4. A man bought a firkin of butter for 8 dollars, a quarter of veal for 45 cents, and a barrel of cider for 3 dollars and 25 cents ; how much did he give for the whole ?

5. A man sold a horse for 127 dollars, a load of hay for 15 dollars, and 3 barrels of cider for 12 dollars ; how much did he receive for the whole ? 154

6. A man travelled 27 miles in one day, 15 miles the next day, and 8 miles the next ; how many miles did he travel in the whole ?

7. A man received 42 dollars and 37 cents of one person, 4 dollars and 68 cents of another, and 7 dollars and 83 cents of a third ; how much did he receive in the whole ?

8. I received 25 dollars and 58 cents of one man, 45 dollars and 83 cents of another, and 8 dollars and 39 cents of a third ; how much did I receive in the whole ?

The two last examples may be performed in the mind, but they will be rather difficult. A more convenient method will soon be found.

NUMERATION.

1. Write in words the following numbers.

1	27	24	10,000
2	35	25	20,030
3	58	26	50,705
4	63	27	67,083
5	70	28	300,050
6	84	29	476,089
7	96	30	707,720
8	100	31	1,000,370
9	103	32	5,600,073
10	110	33	8,081,305
11	113	34	59,006,341
12	127	35	305,870,400
13	308	36	590,047,608
14	520	37	1,000,000,000
15	738	38	3,670,000,387
16	1,000	39	45,007,070,007
17	1,001	40	680,230,100,700
18	1,010	41	50,787,657,000,500
19	1,100	42	270,060,838,003,908
20	1,018	43	68,907,605
21	2,107	44	56,000,034,750
22	3 250	45	6,703,720,000,857
23	5,796		

Write in figures the following numbers.

1. Thirty-four.
2. Fifty-seven.
3. Sixty-three.
4. Eighty.
5. One hundred.
6. One hundred and one.
7. One hundred and ten.
8. Three hundred and eleven.
9. Five hundred and seventeen.
10. Eight hundred and fifty.
11. Nine hundred and eighty-six.
12. One thousand and one.
13. One thousand and ten.
14. Three thousand, one hundred and one.
15. Five thousand and sixty.

16. Ten thousand and five.
17. Thirty thousand, five hundred, and four.
18. Sixty-seven thousand, and forty.
19. Five hundred thousand, and seventy-one.
20. Two hundred and seven thousand, six hundred.
21. Four millions, sixty thousand, and eighty-four.
22. Ninety-seven millions, thirty-five thousand, eight hundred and five.
23. Fifty millions, seventy thousand, and eight.
24. Three hundred millions, and fifty-seven.
25. Two billions, fifty-three millions, three hundred and five thousand, two hundred.
26. Fifty billions, two hundred and seven millions, sixty-seven thousand, two hundred.
27. Eighty-seven millions, and sixty-three.
28. Six hundred billions, two hundred and seven thousand, and three.
29. Thirty-five trillions, nine millions, and fifty-eight.
30. Six hundred and fifty-seven trillions, seven billions, ninety-seven thousand, and sixty-seven.
31. Seventy millions, two hundred and fifty thousand, three hundred and sixty-seven.
32. Four hundred and seven trillions, and eighty-seven thousand.
33. Thirty-five billions, ninety-eight thousand, one hundred.
34. Forty millions, two hundred thousand, and seventy-four.
35. Eighty-three millions, seven hundred and sixty-three thousand, nine hundred and fifty-seven. X

ADDITION.

II. 1.* A man bought a watch for fifty-eight dollars, a cane for five dollars, a hat for ten dollars, and a pair of boots for six dollars. What did he give for the whole?

2. In an orchard there are six rows of trees; in the two first rows, there are fifteen trees in each row; in the third row, seventeen; in the fourth row, eleven; in the fifth row,

* See First Lessons, sect. I.

eight ; and in the sixth row, nineteen. How many trees are there in the orchard ?

3. Four men bought a piece of land ; the first gave sixty-three dollars ; the second, seventy-eight ; the third, forty-five ; and the fourth, twenty-three. How much did they give for the land ?

4. In an orchard, 19 trees bear cherries, twenty-eight bear peaches, 8 bear plums, and 54 bear apples. How many trees are there in the orchard ?

5. How many days are there in a year, there being in January 31 days ; in February 28 ; in March 31 ; in April 30 ; in May 31 ; in June 30 ; in July 31 ; in August 31 ; in September 30 ; in October 31 ; in November 30 ; in December 31 ?

6. The distance from Portland (in Maine) to Boston, is 114 miles ; from Boston to Providence, 40 miles ; from Providence to New Haven 122 miles ; from New Haven to New York, 88 miles ; from New York to Philadelphia, 95 miles ; from Philadelphia to Baltimore, 102 miles ; from Baltimore to Charleston, S. C. 716 miles ; from Charleston to Savannah, 110 miles. How many miles is it from Portland to Savannah ?

7. What number of dollars are there in four bags ; the first containing 275 dollars ; the second, 356 ; the third, 178 ; the fourth, 69 ?

8. How many times does the hammer of a clock strike in 24 hours ?

Note. At 1 o'clock it strikes once, at 2 o'clock it strikes twice, &c.

9. A man has four horses ; the first is worth sixty-seven dollars ; the second is worth eighty-four dollars ; the third is worth one hundred and twenty dollars ; and the fourth is worth one hundred and eighty-seven dollars ; and he has four saddles worth twelve dollars apiece. How much are the horses and saddles worth ?

10. A man owns five houses ; for the first he receives a rent of 427 dollars ; for the second, 763 dollars ; for the third, 654 dollars ; for the fourth, 500 dollars ; and for the fifth, 325 dollars ; and the rest of his income is 3,250 dollars. What is his whole income ?

11. A gentleman owns five farms ; the first is worth 11,500 dollars ; the second, 8,057 dollars ; the third, 2,468 dollars ; the fourth, 9,462 dollars ; and the fifth, 850 dollars ;

and he owns a house worth 15,000 dollars, a carriage worth 753 dollars, and two horses worth 175 dollars apiece. How much are they all worth ?

12 A merchant bought four pieces of cloth, each piece containing 57 yards. For the first piece he gave 235 dollars; for the second, 384 dollars; for the third, 327 dollars; and for the fourth, 486 dollars. How many yards of cloth did he buy ? How much did he give for the whole ?

13. In 1818 the navy of the United States consisted of three 74s; five 44 gun frigates; three 36s; two 32s; one 20; ten 18s. How many guns did they all carry ?

14. Suppose it requires 650 men to man a 74; 475 to man a 44; 275 to man a 36; 350 to man a 32; 200 to man a 20; and 180 to man an 18. How many men would it take to man the whole ?

15. The hind quarters of a cow weighed one hundred and five pounds each; the fore quarters weighed ninety-four pounds each; the hide weighed sixty-three pounds; and the tallow seventy-six pounds. What was the whole weight of the cow ?

16. A man bought a barrel of flour for 6 dollars, and sold it so as to gain 2 dollars. How much did he sell it for ?

17. I bought a quantity of salt for 18 dollars, and sold it for 7 dollars more than I gave for it; how much did I sell it for ?

18. A man bought three hogsheads of molasses for 132 dollars, and sold it so as to gain 25 dollars; how much did he sell it for ?

19. A man being asked his age, answered that he was twenty-seven years old when he was married, and that he had been married thirty-nine years. How old was he ?

20. A man being asked his age, answered that he had passed the 19 first years of his life in America, and that he had afterwards spent 7 years in Germany, 13 years in France, 3 years in Holland, and 24 years in England. How old was he ?

21. A merchant bought four hogsheads of wine for four hundred and thirty-seven dollars, and sold it again for ninety-four dollars more than he gave for it. How much did he sell it for ?

22. A man commenced trade with three thousand, two hundred and fifty dollars; after trading for some time, he

found he had gained two hundred and thirty-seven dollars. How much had he then ?

23. Money was first made at Argos, eight hundred and ninety-four years before Christ. How long has it been in use at this date, 1822 ?

24. The war between Great Britain and the American colonies commenced in 1775 and continued 8 years. In what year was the war concluded ?

25. General Washington was born in the year 1732, and was 67 years old when he died. In what year did he die ?

26. The first tragedy was acted at Athens, on a cart, by Thespis, five hundred and thirty-six years before Christ. How many years is it since ?

27. What was the number of inhabitants in the New England States, in 1820, there being in

Maine	298,335
New Hampshire	244,161
Vermont	235,764
Massachusetts	523,287
Rhode Island	83,059
Connecticut	275,248 ?

28. What was the number of inhabitants in the Middle States, there being in

New York	1,372,812
New Jersey	277,575
Pennsylvania	1,049,398
Delaware	72,749
Maryland	407,350 ?

29. What was the number of inhabitants in the following States, there being in

Virginia	1,065,366
North Carolina	638,829
South Carolina	490,309
Georgia	340,989
Kentucky	564,317
Tennessee	422,813
Alabama	127,901
Mississippi	75,448
Louisiana	153,407 ?

30. What was the number of inhabitants in the following States, there being in

Ohio	581,434
Indiana	147,178

Note. Observe that when you multiply by 10, it is done by annexing a zero to the right of the number ; and by 100, it is done by annexing two zeros, &c. ; and find the reason why.

3. What would a hogshead of wine come to, at ten cents a pint ?

4. If 10 men can do a piece of work in 7 days, how many days will it take 1 man to do it ?

5. What would an ox, weighing 873 pounds, come to, at 10 cents a pound ?

6. If 100 men were to receive 8 dollars apiece, how many dollars would they all receive ?

7. If 27 men were to receive 100 dollars apiece, how many dollars would they all receive ?

FEDERAL MONEY.

10 mills (m.)	make	1 cent	marked	c.
10 cents		1 dime		d.
10 dimes		1 dollar		dol. or \$.
10 dollars		1 eagle		E.

8. In 3 dimes how many cents ?

9. In 5 dollars how many dimes ? How many cents ?

10. In 17 dollars how many cents ?

11. In 83 cents how many mills ?

12. In 753 dols. how many cents ?

13. In 1 dol. how many mills ?

14. In 84 dols. how many mills ?

15. In 7 dols. and 53 cents, how many cents ?

16. In 183 dols. and 14 cents, how many cents ?

17. In 283 dols. 43 cents and 8 mills, how many mills ?

18. In 8246 dols. 2 d. 5 c. 6 m. how many mills ?

It is usual to write dollars and cents in the following manner : 43 dols. 5. d. 7 c. and 4 mills, is written \$43.574. The character \$ written before shows that it is federal money. The figures at the left of the point (.) are so many dollars, the first figure at the right of the point is so many dimes, the next so many cents, and the third so many mills.

It may be observed that when dollars stand alone, they are changed to dimes by annexing one zero to the right, because that multiplies them by 10. They are changed to cents by annexing two zeros, because that multiplies them

by 100. They are changed to mills by annexing three zeros, because that multiplies them by 1,000. Thus 43 dollars are 430 dimes, 4,300 cents, or 43,000 mills. 5 dimes are 50 cents, or 500 mills. 7 cents are 70 mills. The above example then may be read 43 dols. 57 cents and 4 mills; or 435 dimes, 7 cents, and 4 mills; or 4,357 cents and 4 mills; or 43,574 mills. When there are dollars, dimes, and cents, the figures on the left of the point may be read dollars, and those on the right, cents; or they may be all read together as cents. When the number of cents exceeds 100, they are changed to dollars by putting a point between the second and third figures from the right. If there are mills in the number, all the figures may be read together as mills. Any number of mills are changed to dollars by putting a point between the third and fourth figure from the right; the figures at the left will be dollars, and those at the right, dimes, cents, and mills. Since any sum which has cents or mills in it, may be considered as so many cents or mills, it is evident that any operation, as addition, multiplication, &c. may be performed upon it in the same manner as upon simple numbers.

If the sum consists of dollars and a number of cents less than ten, there must be a zero between the dollars and the cents in the place of dimes. Thus 7 dols. and 5 cents must be written \$7.05.

19. What will 10 yards of cloth cost at \$4.53 a yard?
20. What will 10 pounds of coffee cost at \$0.27 a pound?
21. What will 100 sheep cost at \$8.45 apiece?
22. What will 1,000 yards of cloth cost at \$0.35 a yard?

23.	Multiply	5	by	10	32.	Multiply	90	by	100
24.		47		10	33.		4		1,000
25.		30		10	34.		73		1,000
26.		124		10	35.		80		1,000
27.		387		10	36.		132		1,000
28.		450		10	37.		800		1,000
29.		13,008		10	38.		1,643		1,000
30.		7		100	39.		725		10,000
31.		38		100	40.		76,438		10,000

- VI. 1. What cost 75 lb. of tobacco at 20 cents a pound?
2. What cost 30 cords of wood at \$6.75 a cord?
3. If 400 men receive 135 dollars apiece, how many dollars will they all receive?

4. If 30 men can do a piece of work in 43 days, how many days will it take 1 man to do it?

5. If 70 men can do a piece of work in 83 days, how many men will it take to do it in one day?

6. If the pendulum of a clock swing once in a second, how many times will it swing in an hour? How many times in a day? How many times in a week?

7. How many seconds are there in 10 min. 23 sec.?

8. How many minutes are there in 7 h. 23 min.?

9. How many minutes are there in 3d. 7 h. 43 min.?

10. How many seconds are there in 8 d. 7 h. 34 min. 19 sec.?

11. A garrison of 3,000 men are to be paid, and each man is to receive 128 dollars. How many dollars will they all receive?

12. What cost 30 barrels of cider at \$3.50 a barrel?

13. There are 320 rods in a mile, how many rods are there in 7 miles? How many in 10 miles? How many in 30 miles? How many in 500 miles?

14. Multiply 34 by	20	18. Multiply 4,007 by	80
15. 57	300	19. 11,600	700
16. 250	60	20. 4,960	40,000
17. 387	5,000	21. 13,400	8,000

VII. 1. What will 17 oxen come to at 42 dollars apiece?

Note. Find the price of 10 oxen and of 7 oxen separately, and then add them together.

2. What will 34 barrels of flour come to, at \$6.43 a barrel?

Note. Find the price of 30 barrels and of 4 barrels separately, and then add them together.

3. What cost 19 gallons of wine, at \$1.28 a gallon?

4. What cost 68 yards of cloth, at \$9.36 a yard?

5. What will 87 thousand of boards come to, at \$5.50 a thousand?

6. What will 58 barrels of beef come to, at \$9.75 a barrel?

7. What will 87 gallons of brandy come to, at \$1.60 a gallon?

8. A and B depart from the same place and travel in opposite directions, A at the rate of 38 miles in a day, and B at the rate of 42 miles a day. How far apart will they be at the end of the first day? How far at the end of 15 days?

9. What will 287 barrels of turpentine come to, at \$3.25 a barrel ?

Note. Find the price of 200 barrels, of 80 barrels, and of 7 barrels separately, and then add them together.

10. What will 358 barrels of bee come to, at \$7.55 a barrel ?

11. A drover bought 853 sheep at an average price of \$3.58 apiece. What were the whole worth ?

12. A merchant bought 105 hundred weight of lead, at \$17.33 a hundred weight ; how much did the whole come to ?

13. If a ship sail 8 miles in an hour, how many miles will she sail in a day, at that rate ? How far in 127 days ?

14. An army of 8,975 men are to receive 138 dollars apiece. How many dollars will they all receive ?

15. An army of 11,327 men are to receive a year's pay, at the rate of 5 dollars a month for each man. How many dollars will they all receive ?

16. Bought 207 chaldrons of coal, at \$12.375 a chaldron. How much did it come to ?

17. Bought 857 pounds of sugar at \$0.125 a pound. How much did it come to ?

18. Shipped 350 casks of butter worth \$14.50 a cask. What was the value of the whole ?

19. What cost 354 fother of lead, at \$63.57 a fother ?

20. What cost 25,837 gallons of brandy, at \$2.375 a gallon ?

21. If it cost \$28.56 to clothe a soldier 1 year, how many dollars will it cost to clothe an army of 15,200 men the same time ?

22.	Multiply	887	by	47
23.		6,300		250
24.		1,006		308
25.		15,030		1,005
26.		38,446		2,700
27.		487,500		38,400
28.		7,035,064		30,704
29.		9,800,000		37,000
30.		78,508,060		300,005
31.		43,060,085		703,004

Miscellaneous Examples.

1. If 1 pound of tobacco cost 28 cents, what will a keg of tobacco, weighing 112 pounds, cost ?

AVOIRDUPOIS WEIGHT.

16 drams (dr.)	make	1 ounce,	marked	oz.
16 ounces		1 pound		lb.
28 pounds		1 quarter		qr.
4 quarters		1 hundred weight		cwt
20 hundred weight		1 ton		T.

By this weight are weighed all things of a coarse and drossy nature; such as butter, cheese, flesh, grocery wares, and all metals except gold and silver.

2. At 12 cents per lb. how much will 1 quarter of sugar come to ?

3. If 1 quarter of sugar cost 7 dollars, what will 1 cwt. cost ?

4. How many pounds are there in 1 cwt. ?

5. In 2 cwt. 2 qrs. how many quarters ?

6. In 3 qrs. 18 lb. how many pounds ?

7. In 2 cwt. 1 qr. how many pounds ?

8. In 1 cwt. 3 qrs. 23 lb. how many pounds ?

9. In 18 lb. how many ounces ?

10. In 12 cwt. how many ounces ?

11. In 14 cwt. 3 qrs. 15 lb. 8 oz. how many ounces ?

12. At 9 cents a pound, what cost 3 cwt. 2 qrs. 16 lb. of sugar ?

TROY WEIGHT.

24 grains (gr.)	make	1 penny-weight,	marked	dwt.
20 penny-weights		1 ounce		oz.
12 ounces		1 pound		lb.

By this weight are weighed gold, silver, jewels, corn, bread, and liquors.

13. If an ingot of silver weigh 42 oz. 13 dwt., what is it worth at 4 cents per dwt. ?

14. What is the value of a silver cup weighing 9 oz. 4 dwt. 16 gr. at 3 mills per grain ?

15. In 15 ingots of gold each weighing 9 oz. 5 dwt. 7 gr. how many grains ?

APOTHECARIES' WEIGHT.

20 grains (gr.)	make	1 scruple,	marked	sc.
3 scruples		1 dram		dr. or ʒ
8 drams		1 ounce		oz. or ʒ
12 ounces		1 pound		lb.

Apothecaries use this weight in compounding their medicines, but they buy and sell by Avoirdupois weight. Apothecaries' is the same as Troy weight, having only some different divisions.

16. In 9 lb. 8 $\frac{3}{4}$ 1 3. 2 sc. 19 gr. how many grains ?

DRY MEASURE.

2 pints (pt.)	make	1 quart,	marked	qt.
8 quarts		1 peck		pk.
4 pecks		1 bushel		bu.
8 bushels		1 quarter		qr.

By this measure, salt, ore, oysters, corn, and other dry goods are measured.

17. At 43 cents a peck, what cost 14 bu. 3 pks. of wheat ?

18. At 3 cents a quart what will 5 bu. 2 pks. 3 qts. of salt come to ?

CLOTH MEASURE.

2 $\frac{1}{4}$ inches (in.)	make	1 nail,	marked	nl.
4 nails		1 quarter		qr.
4 quarters		1 yard		yd.
3 quarters		1 ell Flemish		Ell Fl.
5 quarters		1 ell English		Ell Eng.
5 quarters		1 aune or ell French.		

19. At 27 cents a nail, what is the price of 2 yds. 1 qr. 3 nls. of cloth.

20. If 1 qr. cost \$2.50, what cost 43 ells English of broadcloth ?

21. At 42 cents a nail, what cost 13 ells Fl. 3 qrs. of broadcloth ?

22. How many seconds are there in 4 years ?

23. How many seconds are there in 8 y. 3 mo. 2 wks. 2 d. 19 h. 43 min. 57 sec. ?

24. How many calendar months are there from the 1st Feb. 1819, to the 1st August, 1822 ?

25. How many days are there from the 7th Sept. 1817, to the 17th May, 1822 ?

26. How many minutes are there from the 13th July, at 43 minutes after 9 in the morning, to the 5th Nov. at 19 min. past 3 in the afternoon ?

27. How many seconds old are you ?

28. How many seconds from the commencement of the Christian era to the year 1822 ?

29. At 4 cents an ounce, how much would 3 cwt 2 qrs. 18 lb. 7 oz. of snuff come to ?

30. At 23 cents a pound, what would 3 T. 2 cwt. 3 qrs. 16 lb. of tobacco come to ?

31. If a cannon ball flies 8 miles in a minute, how far would it fly at that rate in 7 y. 2 mo. 3 wks. 2 days ?

32. If a quantity of provision will last 324 men 7 days, how many men will it last one day ?

33. A garrison of 527 men have provision sufficient to last 47 days, if each man is allowed 15 oz. a day ; how many days would it last if each man were allowed only 1 oz. a day ?

34. A garrison of 527 men have provision sufficient to last 47 days, if each man is allowed 15 oz. a day ; how many men would it serve the same time, if each man were allowed only 1 oz. a day ?

35. If a man performs a journey in 58 days, by travelling 9 hours in a day, how many hours is he performing it ?

36. If by working 13 hours in a day a man can perform a piece of work in 217 days ; how long would it take him to do it if he worked only 1 hour in a day ?

37. If by labouring 14 hours in a day 237 men can build a ship in 132 days, how many days would it take them, if they work only 1 hour in a day ? How many men would it take to do it in 132 days, if they work only 1 hour in a day ?

38. How many yards of cloth that is 1 qr. wide, are equal to 27 yards that is 1 yd. wide ?

39. If a piece of cloth that is 1 qr. wide is worth \$67.25, what is a piece containing the same number of yards of the same kind of cloth worth, that is 1 yd. wide ?

40. If a bushel of wheat afford 65 eight-penny loaves, how many penny loaves may be obtained from it ?

41. What is the price of 4 pieces of cloth, the first containing 21 yards, at \$4.75 a yard ; the second containing 27 yards, at \$7.25 a yard ; the third containing 18 yards, at \$9.00 a yard ; and the fourth containing 32 yards, at \$8.57 a yard ?

42. A man bought 15 lb. of beef, at 9 cents a pound ; 28 lb. of sugar, at \$0.125 a pound ; 18 gallons of wine, at

\$1.56 a gallon ; a barrel of flour, for \$8.00 ; and 3 barrels of cider, at \$3.50 a barrel. How much did the whole amount to ?

Interest is a reward allowed by a debtor to a creditor for the use of money. It is reckoned by the hundred, hence the rate is called so much *per cent.* or *per centum.* *Per centum* is Latin, signifying by the hundred. 6 per cent. signifies 6 dollars on a hundred dollars, 6 cents on a hundred cents, £6 on £100, &c. so 5 per cent. signifies 5 dollars on 100 dollars, &c. *Insurance, commission, and premiums* of every kind are reckoned in this way. *Discount* is so much per cent. to be taken out of the principal.

43. If 1 dollar gain 6 cents interest a year, how much will 13 dollars gain in the same time ?

44. What is the interest of \$43.00 for 1 year at 6 per cent. ?

45. What is the interest of \$157.00 for 1 year at 5 per cent. ?

46. What is the interest of \$1.00 for 2 years at 6 per cent. ? What for 5 years ?

47. What is the interest of \$247.00 for 3 years at 7 per cent. ?

48. How much must I give for insuring a ship and cargo worth \$150,000.00 at 2 per cent. ?

49. Imported some books from England, for which I paid \$150.00 there. The duties in Boston were 15 per cent., the freight \$5.00. What did the books cost me ?

50. What must I receive for a note of \$275.00 that has been due 3 years, interest at 6 per cent. ?

51. A man failing in trade, is able to pay only \$0.68 on a dollar ; how much can he pay on a debt of \$5 dollars ? How much on a debt of 20 dollars ?

52. A man failing in trade, is able to pay only \$0.73 on a dollar ; how much will he pay on a debt of \$47.00 ? How much on a debt of \$123.00 ? How much on a debt of \$2,500.00 ?

53. A merchant bought a quantity of goods for 243 dollars, and sold them so as to gain 15 per cent. ; how much did he gain, and how much did he sell them for ?

54. A merchant bought a quantity of goods for \$843.00 ; how much must he sell them for to gain 23 per cent. ?

SUBTRACTION.

VIII 1.* David had nine peaches, and gave four of them to George; how many had he left?

2. A man having 15 dollars, lost 9 of them; how many had he left?

3. David and William counted their apples; David had 35, and William had 17 less; how many had William?

4. A man owing 48 dollars, paid 29; how many did he then owe?

5. A man owing 48 dollars, paid all but 19; how many did he pay?

6. A man owing a sum of money, paid 29 dollars, and then he owed 19; how many did he owe at first?

7. A man being asked how old he was when he was married, answered, that his present age was sixty-four years, and that he had been married 37 years; what was his age when he was married?

8. A man being asked how long he had been married, answered, that his present age was sixty-four years, and that he was twenty-seven years old when he was married; how long had he been married?

9. A man being asked his age, answered, that he was 27 years old when he was married, and that he had been married 37 years. What was his age?

10. A man bought a piece of cloth containing 93 yards, and sold 45 yards of it; how many yards had he left?

11. A merchant bought a piece of cloth for one hundred and fifteen dollars, and sold it again for one hundred and thirty-eight dollars. How much did he gain by the bargain?

12. A merchant sold a piece of cloth for 138 dollars, which was 23 dollars more than he gave for it; how much did he give for it?

13. A merchant bought a piece of cloth for 115 dollars, and sold it so as to lose 23 dollars. How much did he sell it for?

14. A man bought a quantity of wine for 753 dollars, but not being so good as he expected, he was willing to lose 87 dollars in the sale of it; how much did he sell it for?

15. A man owing two thousand, six hundred, and forty-

* See First Lessons, sect. 1.

three dollars, paid at several times as follows; at one time two hundred and seventy-five dollars; at another fifty-eight dollars; at another seven dollars; and at another one thousand and sixty-seven dollars; how much did he then owe?

16. From Boston to Providence it is 41 miles, and from Boston to Attleborough (which is upon the road from Boston to Providence) it is 28 miles; how far is it from Attleborough to Providence?

17. From Boston to New York it is 250 miles; suppose a man to have set out from Boston for New York, and to have travelled 14 hours, at the rate of five miles in an hour; how much farther has he to travel?

18. General Washington was born A. D. 1732, and died in 1799; how old was he when he died?

19. Dr. Franklin died A. D. 1790, and was 84 years old when he died; in what year was he born?

20. A gentleman gave 853 dollars for a carriage and two horses; the carriage alone was valued at 387 dollars; what was the value of the horses? How much more were the horses worth than the carriage?

21. A man died leaving an estate of eight thousand, four hundred, and twenty-three dollars; which he bequeathed as follows; two thousand, three hundred dollars to each of his two daughters, and the rest to his son; what was the son's share?

22. A gentleman bought a house for sixteen thousand, and twenty-eight dollars; a carriage for three hundred and eight dollars, and a span of horses for five hundred and eighty-three dollars. He paid as follows; at one time ninety-seven dollars; at another, one thousand, and eight dollars; and at a third, four thousand, two hundred, and six dollars. How much did he then owe?

23. In Boston, by the census of 1820, there were 43,278 inhabitants; in New York, 123,706. How many more inhabitants were there in New York than in Boston?

24. In Boston, by the census of 1810, the number of inhabitants was 33,250; and in 1820 it was 43,278. What was the increase for 10 years?

25. A merchant bought 2 pipes of brandy for 642 dollars, and retailed it at 3 dollars a gallon. How much did he gain?

26. A man bought 359 kegs of tobacco, at 9 dollars a keg; 654 barrels of beef, at 8 dollars a barrel; 9 bags of coffee, at 29 dollars a bag. In exchange he gave 3 hhds.

of brandy, at 2 dollars a gallon ; 473 cwt. of sugar, at 8 dollars per cwt. How much did he then owe ?

27. A man bought 7 lb. of sugar, at \$0.125 per lb. ; 4 gals. of molasses, at 0.375 per gall. ; 5 lb. of raisins, at \$0.14 per lb. ; 1 bbl. of flour, for \$6.00. He paid a ten dollar bill ; how much change ought he to receive back ?

28. Two merchants, A and B, traded as follows ; A sold B 24 pipes of wine, at \$1.87 per gal. ; and B sold A 32 hhds. of molasses, at \$47.00 per hhd. The balance was paid in money ; how much money was paid, and which received it ?

29. A merchant sold 35 barrels of flour, at 7 dollars per barrel ; but for ready money he made 10 per cent. discount. How much did the flour come to after the discount was made ?

30. A merchant bought 15 hhds. of wine, at \$2.00 per gallon ; but not finding so ready a sale as he wished, he was obliged to sell it so as to lose 8 per cent. on the cost. How much did he lose, and how much did he sell the whole for ?

31. Suppose a gentleman's income is \$1,836.00 a year, and he spends \$3.27 a day, one day with another ; how much will he spend in the year ? How much of his income will he save ?

32. What is the difference between 487,063 and 24,703 ?

33. How much larger is 380,064 than 87,065 ?

34. How much smaller is 8.756 than 37,005,078 ?

35. How much must you add to 7,643 to make 16,487 ?

36. How much must you subtract from 2,483 to leave 527 ?

37. If you divide 3,880 dollars between two men, giving one 1,907 dollars, how much will you give the other ?

38. Subtract 38,506 from 90,000.

39. Subtract 20,076 from 180,003.

40. A man having 1,000 dollars, gave away one dollar ; how many dollars had he left ?

41. A man having \$1,000.00, lost seventeen cents, how much had he left ?

42. What is the difference between 13 and 800,060 ?

43. What is the difference between 160,000 and 70 ?

44. How much must you add to 123 to make 10,000 ?

45. A man's income is \$2,738.43 a year, and he spends \$1,897.57 ; how much does he save ?

46. Subtract 93 from 80,640.

47. A merchant shipped molasses to the amount of \$15,000.00, but during a storm the master was obliged to throw overboard to the amount of \$853.42; what was the value of the remaining part?

48. A man bought goods to the amount of \$1,153.00, at 6 months' credit, but preferring to pay ready money, a discount was made of \$35.47. What did he pay for the goods?

49. Subtract one cent from a thousand dollars.

DIVISION.

IX. 1. How many oranges, at 6 cents apiece, can you buy for 36 cents?

2. How many barrels of cider, at 3 dollars a barrel, can be bought for 27 dollars?

3. How many bushels of apples, at 4 shillings a bushel, can you buy for 56 shillings?

4. How many barrels of flour, at 7 dollars a barrel, can you buy for 98 dollars?

5. How many dollars are there in 96 shillings?

ENGLISH MONEY.

4 farthings (qr.)	make	1 penny,	marked	d.
12 pence		1 shilling		s.
20 shillings		1 pound		£
21 shillings		1 guinea.		

This money was used in this country until A. D. 1786, when, by an act of Congress, the present system, which is called *Federal Money*, was adopted. Some of these denominations, however, are still used in this country, as the shilling and the penny, but they are different in value from the English. In English money 4s. 6d. is equal in value to the Spanish and American dollar. But a dollar is called six shillings in New England; eight shillings in New York; and 7s. 6d. in New Jersey. The English guinea is equal to 28s. in New England currency. The dollar will be considered 6s. in this book, unless notice is given of a different value.

6. How many pence are there in 84 farthings?

7. How many lb. of sugar, at 9d. per lb., may be bought for 117d.?

8. How much beef, at 8 cents per lb., may be bought for \$1.12?

9. How many lb. of steel, at 13 cents per lb., may be bought for \$2.21?

10. How many cwt. of sugar, at \$14 per cwt., may be bought for \$280?

11. How many cwt. of cocoa, at \$17 per cwt., may be bought for \$391?

12. How much cocoa, at \$25 per cwt., may be bought for 475 dollars?

13. How much sugar, at 8d. per lb., may be bought for 4s. 8d.?

14. How much cloth, at 4s. per yard, may be bought for 1£. 12s.?

15. How much snuff, at 2d. 2 qr. per oz., may be bought for 40 farthings?

16. How much wheat, at 8s. per bushel, may be bought for 2£. 16s.?

17. How much cloth, at 7s. per yard, may be bought for 3£. 17s.?

18. How much pork, at 9d. per pound, may be bought for 1£. 4s. 9d.?

19. How much molasses, at 11d. per quart, may be bought for 2£. 15s. 11d.?

20. In 38 shillings how many pounds?

21. In 53 shillings how many pounds?

22. In 87 shillings how many pounds?

23. In 115 shillings how many pounds?

24. In 178 shillings how many pounds?

25. In 253 shillings how many pounds?

26. In 6,247 shillings how many pounds?

27. In 38 pence how many shillings?

28. In 153 pence how many shillings?

29. In 1,486 pence how many shillings?

30. In 26,842 pence how many shillings?

31. In 89 farthings how many pence?

32. In 243 farthings how many pence?

33. In 3,764 farthings how many pence?

34. In 137 farthings how many pence? How many shillings?

35. In 382 farthings how many shillings?

36. In 370 pence how many shillings? How many pounds?

37. In 846 pence how many pounds?

38. In 3,858 pence how many pounds?

39. In 2,340 farthings how many pence? How many shillings? How many pounds?

40. In 87,253 farthings how many pounds?

41. In 87 pints how many quarts? How many gallons?

42. In 230 pints how many gallons?

43. In 98 gills how many pints? How many quarts?

44. In 183 gills how many pints? How many quarts? How many gallons?

45. In 4,217 gills how many quarts? How many gallons?

46. In 23,864 gills how many gallons?

47. In 148 gallons how many hogsheads?

48. In 3,873 gallons how many pipes? How many tuns?

49. In 48,784 gills of wine how many hogsheads? How many pipes? How many tuns?

50. In 873 seconds how many minutes?

51. In 87 hours how many days?

52. In 73 days how many weeks? How many months?

53. In 2,739 minutes how many hours? How many days?

54. In 24,796,800 seconds how many minutes? How many hours? How many days? How many weeks? How many months?

55. In 506,649,600 seconds how many years, allowing 365 days to the year?

56. In 273 drams how many pounds Avoirdupois?

57. In 5,079 drams how many ounces? How many pounds?

58. In 573,440 drams how many ounces? How many pounds? How many quarters? How many hundred-weight? How many tons?

59. In 5,592,870 ounces how many tons?

60. In 384 grains Troy how many penny-weights?

61. In 325 dwt. how many ounces?

62. In 431 oz. Troy how many pounds?

63. In 198,706 grains Troy how many penny-weights? How many ounces? How many pounds?

64. In 678,418 grains Troy how many pounds?

65. In 37 nails how many yards?

66. In 87 nails how many ells English?

67. In 243 nails how many yards ?
68. In 372 quarters how many ells Flemish ?
69. In 3,107 nails how many ells Flemish ?
70. In 327 shillings how many English guineas ?
71. In 68 pence how many six-pences ?
72. In 130 pence how many eight-pences ?
73. In 342 pence how many four-pences ?
74. In 2,086 pence how many nine-pences ?
75. In 3,876 half-pence how many pence ?
76. In 3,948 farthings how many pence ? How many three-pences ?
77. In 58,099 half-pence how many pounds ?
78. In 57,604 farthings how many guineas at 28s. each ?
79. In 3£. how many pence ? How many three-pences ?
80. In 73£. how many shillings ? In these shillings how many dollars ?
81. In 84£. how many shillings ? In these shillings how many guineas ?
82. In 37£. 4s. how many shillings ? How many dollars ?
83. How many pence are there in a dollar ?
84. In 382 pence how many dollars ?
85. In 32£. 8s. 4d. how many dollars ?
86. In 13 yards how many quarters ? In these quarters how many ells Flemish ?
87. In 2 y. 3 qr. how many quarters ? In these quarters how many ells English ?
88. In 17 ells Flemish how many quarters ? In these quarters how many aunes ?
89. In 73 aunes how many yards ?
90. From Boston to Liverpool is about 3,000 miles ; if a ship sail at the rate of 115 miles in a day, in how many days will she sail from Boston to Liverpool ?
91. If an ingot of silver weigh 36 oz. 10 dwt. how many pence is it worth at 3d. per dwt. ? How many pounds ?
92. How many spoons, weighing 17 dwt. each, may be made of 3lb. 6 oz. 18 dwt. of silver ?
93. A goldsmith sold a tankard for 10£. 8s. at the rate of 5s. 4d. per ounce. How much did it weigh ?
94. How many coats may be made of 47 yds. 1 qr. of broadcloth, allowing 1 yd. 3 qrs. to a coat ?
95. What number of bottles, containing 1 pt. 2 gls. each, may be filled with a barrel of cider ?
96. How many vessels, containing pints, quarts, and two

quarts, and of each an equal number, may be filled with a pipe of wine ?

Note. Three vessels, the first containing a pint, the second a quart, and the third two quarts, are the same as one vessel containing 3 qts. 1 pt. The question is the same as if it had been asked, how many vessels, each containing 3 qts. 1 pt., might be filled.

97. A man hired some labourers, men and boys, and of each an equal number ; to the men he gave 7s. and to the boys 3s. a day, each. How many shillings did it take to pay a man and a boy ? It took 3£. 10s. to pay them for 1 day's work. How many were there of each sort ?

Note. The question is the same as if it were asked, how many men this money would pay at 10s. per day.

98. A man bought some sheep and some calves, and of each an equal number, for \$165.00 ; for the sheep he gave \$7.75 apiece, and for the calves \$3.25. How many were there of each sort ?

/ 99. A man having \$70.15, wished to purchase some rye, some wheat, and some corn, and an equal number of bushels of each kind. The rye was \$0.95 per bushel, the wheat \$1.37, and the corn \$0.73. How many bushels of each sort could he buy if he laid out all his money ?

100. How many table spoons, weighing 23 dwt. each, and tea spoons, weighing 4 dwt. 6 gr. each, and of each an equal number, may be made from 4lb. 1 oz. 1 dwt. of silver ?

/ 101. A merchant has 20 hhds. of tobacco, each containing 8 cwt. 3 qrs. 14 lb. which he wishes to put into boxes containing 7lb. each. How many boxes must he get ?

102. Bought 140 hhds of salt, at \$4.70 per hhd. ; how much did it come to ? How many quintals of fish, at \$2.00 per quintal, will it take to pay for it ?

103. A man bought 18 cords of wood, at 8 dollars a cord, and paid for it with flour, at \$6 a barrel. How many barrels did it take ?

104. A man sold a hogshead of molasses at \$0.40 per gal., and received his pay in corn at \$0.94 per bushel. How many bushels did he receive ?

/ 105. How much coffee, at \$0.25 a pound, can I have for 100 lb. of tea, at \$0.87 per lb. ?

106. How much broadcloth, at \$6.66 per yard, must be given for 2 hhds. of molasses, at \$0.37 per gal. ?

107. How many times is 8 contained in 6,848 ?

108. 12,873 is how many times 3 ?

109. 86,436 is how many times 9 ?

110. 1,740 is how many times 6 ?

111. 18,345 is how many times 5 ?

112. 64,848 is how many times 4 ?

113. 94,456 is how many times 8 ?

114. 80,055 is how many times 15 ?

115. 8,772 is how many times 12 ?

116. 1,924 is how many times 37 ?

117. 1,924 is how many times 52 ?

118. 3,102 is how many times 94 ?

119. 3,102 is how many times 33 ?

120. 4,978 is how many times 131 ?

121. 23,125 is how many times 375 ?

122. 15,341 is how many times 529 ?

123. 49,640 is how many times 136 ?

124. 6,816,978 is how many times 8,253 ?

125. 92,883,780 is how many times 9,876 ?

126. 2,001,049,068 is how many times 261,986 ?

127. 11,714,545,304 is how many times 87,362 ?

128. 921,253,442,978,025 is how many times 918,273,645 ?

Miscellaneous Examples.

1. At 4s. 3d. per bushel, what cost 3 bushels of corn ?

2. At 2s. 3d. per yard, what cost 4 yards of cloth ?

3. What cost 7 lb. of coffee, at 1s. 6d. per lb. ?

4. What cost 3 gallons of wine, at 8s. 3d. per gal. ?

5. What cost 4 quintals of fish, at 13s. 3d. per quintal ?

6. What cost 5 cwt. of iron, at 1£. 9s. 4d. per cwt. ?

7. What cost 6 cwt. of sugar, at 3£. 8s. 4d. per cwt. ?

8. What cost 9 yds. of broadcloth, at 2£. 6s. 8d. per yard ?

9. How much sugar in 3 boxes, each box containing 14 lb. 7 oz. ?

10. At 3£. 9s. per cwt. what cost 7 cwt. of wool ?

11. What is the value of 5 cwt. of raisins, at 2£. 1s. 8d. per cwt. ?

12. How much wool in 3 packs, each pack weighing 2 cwt. 2 qrs. 13 lb. ?

13. What is the weight of 5 casks of raisins, each cask weighing 2 cwt. 3 qrs. 25 lb. ?

14. What is the weight of 12 pockets of hops, each pocket weighing 1 cwt. 2 qrs. 17 lb. ?

15. What is the weight of 16 pigs of lead, each pig weighing 3 cwt. 2 qrs. 17 lb. ?

Note. Divide the multiplier into factors as in Art. IV. ; that is, find the weight of 4 pigs and then of 16.

16. At 7s. 4d. per bushel, what cost 18 bushels of wheat ?

17. What cost 21 cwt. of iron, at 1£. 6s. 8d. per cwt. ?

18. What cost 28 lb. of tea, at 5s. 7d. per lb. ?

19. What cost 32 lb. of coffee, at 1s. 8d. per lb. ?

20. What cost 23 lb. of tea, at 4s. 3d. per lb. ?

Note. Find the price of 21 lb. and then of 2 lb. and add them together, Art. IV.

21. What cost 26 yds. of cloth, at 8s. 9d. per yd. ?

22. What cost 34 cwt. of rice, at 1£. 1s. 8d. per cwt. ?

23. If an ounce of silver cost 6s. 9d., what is that per lb. Troy ? What would 2 lb. 7 oz. cost ?

24. What is the value of 38 yds. of cloth, at 2£. 6s. 4d. per yd. ?

25. A man bought a bushel of corn for 5s. 3d., and a bushel of wheat for 7s. 6d. ; what did the whole amount to ?

26. How much silver in 6 table spoons, each weighing 5 oz. 10 dwts. ?

27. A man bought two loads of hay, one weighing 18 cwt. 3 qrs., and the other 19 cwt. 1 qr. ; how much in both ?

28. A man bought one load of hay for 7£. 3s., and another for 6£. 8s. 4d. ; how much did he give for both ?

29. A man bought 3 vessels of wine ; the first contained 18 gallons ; the second 15 gals. 3 qts. ; and the third 17 gals. 2 qts. 1 pt. How much in the 3 vessels ?

30. A merchant bought 4 pieces of cloth. The first contained 18 yds. 3 qrs. ; the second 23 yds. 1 qr. 3 nls. ; the third 25 yds. ; and the fourth 16 yds. 2 qrs. 2 nls. How many yards in the whole ?

31. A man bought 3 bu. 2 pks. of wheat at one time ; 18 bu. 3 pks. at another time ; 9 bu. 1 pk. 5 qts. at a third ; and 16 bu. 0 pk. 7 qts. at a fourth. How many bushels did he buy in the whole ?

32. A man bought a cask of raisins for 1£. 18s. 4d. ; 1 lb. of coffee for 1s. 6d. ; 1 cwt. of cocoa for 3£. 17s. ; 1 keg

of molasses for 13s. 7d.; 1 box of lemons for 1£. 3s.; 1 bushel of corn for 4s. 3d. How much did the whole amount to?

33. A man bought 4 bales of cotton. The first contained 4 cwt. 2 qrs. 16 lb.; the second 3 cwt. 1 qr. 14 lb.; the third 5 cwt. 0 qr. 23 lb.; and the fourth 4 cwt. 3 qrs. What was the weight of the whole?

34. A merchant bought a piece of cloth, containing 19 yds. 3 qrs., and sold 4 yds. 1 qr. of it; how much had he left?

35. A grocer drew out of a hhd. of wine 17 gals. 3 qts.; how much remained in the hogshead?

36. A bought of B a bushel of wheat for 7s. 6d. He gave him 1 bushel of corn worth 5s. 3d. and paid the rest in money. How much money did he pay?

37. C bought of B a bale of cotton for 18£. 4s. and B bought of C 4 barrels of flour for 9£. 3s. C paid B the rest in money. How much money did he pay?

38. If from a piece of cloth, containing 9 yds. you cut off 1 yd. 1 qr., how much will there be left?

39. If from a piece of cloth, containing 18 yds. 1 qr. you cut off 3 yds. 3 qrs., how much will be left?

40. If from a box of butter, containing 15 lb. there be taken 6lb. 3 oz., how much will be left?

41. A man sold a box of butter for 17s. 4d., and in pay received 7 lb. of sugar, worth 9d. 2qr. per lb. and the rest in money. How much money did he receive?

42. A countryman sold a load of wood for 2£. 8s. and received in pay 3 gals. of molasses at 2s. 3d. per gal., 8 lb. of raisins at 10d. per lb., 1 gal. of wine at 11s. 3d., and the rest in money. How much money did he receive?

43. A smith bought 17 cwt. 3 qrs. of iron, and after having wrought a few days, wishing to know how much of it he had wrought, he weighed what he had left, and found he had 8 cwt. 1 qr. 13 lb. How much had he wrought?

44. A merchant bought 110 bars of iron, weighing 53 cwt. 1 qr. 11 lb., of which he sold 19 bars, weighing 9 cwt. 3 qrs. 15 lb. How much had he left?

45. A merchant bought 17 cwt. 2 qrs. 1 lb. of sugar, and sold 13 cwt. 3 qrs. 17 lb. How much remains unsold?

46. From a piece of cloth, which contained 43 yds. 1 qr., a tailor cut 3 suits, containing 6 yds. 2 qrs. 2 nls. each. How much cloth was there left?

47. The revolutionary war between England and America commenced April 19th, 1775, and a general peace took place Jan. 20th, 1783. How long did the war continue?
48. The war between England and the United States commenced June 18th, 1812, and continued 2 years 8 months 18 days. When was peace concluded?
49. The transit of Venus (that is, Venus appeared to pass over the sun) A. D. 1769, took place at Greenwich, Eng. June 4th, 5 h. 20 min. 50 sec. morn. Owing to the difference of longitude between London and Boston it would take place 4 hours 44 min. 16 sec. earlier by Boston time. At what time did it take place at Boston?

X. 1.* If 1 yard of cloth is worth 2 dollars, what is $\frac{1}{2}$ of a yard worth?

2. What is $\frac{1}{2}$ of 2 dollars?

3. If 2 dollars will buy 1 lb. of indigo, how much will 1 dollar buy? How much will 3 dollars buy? How much will 7 dollars buy? How much will 23 dollars buy? How much will 125 dollars buy.

4. At 3 shillings per bushel, what will $\frac{1}{2}$ of a bushel of corn cost? What will $\frac{2}{3}$ of a bushel cost?

5. At 3 dollars a barrel, what part of a barrel of cider will 1 dollar buy? What part of a barrel will 2 dollars buy? How much will 4 dollars buy? How much will 5 dollars buy? How much will 8 dollars buy? How much will 28 dollars buy?

6. At 3 dollars a box, how many boxes of raisins may be bought for 125 dollars?

7. How many bottles, holding 3 pints each, may be filled with 85 gallons of cider?

8. At 4 dollars a yard, how much will $\frac{1}{4}$ of a yard of cloth cost? How much will $\frac{3}{4}$ of a yard cost? How much will $\frac{5}{8}$ of a yard cost?

9. At 4 dollars a box, what part of a box of oranges may be bought for 1 dollar? What part for 2 dollars? What part for 3 dollars? How many boxes may be bought for 5 dollars? How many for 19 dollars?

10. At 4 dollars a barrel, how many barrels of rye flour may be bought for 327 dollars?

11. At 5 dollars a cord, what will $\frac{1}{2}$ of a cord of wood

* See First Lessons, sect. III. art. B

cost? What will $\frac{3}{4}$ cost? What will $\frac{3}{5}$ cost? What will $\frac{1}{2}$ cost? What will $\frac{2}{3}$ cost? What will $\frac{3}{5}$ cost?

12. At 5 dollars a week, what part of a week's board can I have for 1 dollar? What part for 2 dollars? What part for 3 dollars? What part for 4 dollars? How long can I be boarded for 7 dollars? How long for 18 dollars? How long for 39 dollars?

13. At 5 dollars a barrel, how many barrels of fish may be bought for \$453?

14. If a firkin of butter cost 6 dollars, how much will $\frac{1}{4}$ of a firkin cost? How much will $\frac{2}{3}$ cost? How much will $\frac{3}{4}$ cost? How much will $\frac{1}{2}$ cost? How much will $\frac{3}{5}$ cost? How much will $\frac{1}{3}$ cost?

15. At 6 dollars a ream, what part of a ream of paper may be bought for 1 dollar? What part for 2 dollars? What part for 5 dollars? How many reams may be bought for 17 dollars? How many will 56 dollars buy?

16. At 6 dollars a barrel, how many barrels of flour may be bought for 437 dollars?

17. If a stage runs at the rate of 7 miles in an hour, in what part of an hour will it run 1 mile? In what part of an hour will it run 3 miles? In what part of an hour will it run 5 miles? In what time will it run 17 miles? In what time will it run 59 miles? In what time will it run from Boston to New York, it being 250 miles?

18. At 8 dollars a chaldron, how many chaldrons of coals may be bought for 75 dollars?

19. At 5 dollars a ream, how many reams of paper may be bought for 253 dollars?

20. At 7 dollars a barrel, how many barrels of flour may be bought for 2,434 dollars?

21. At 9 dollars a barrel, how many barrels of beef may be bought for 3,827 dollars?

22. At 8 dollars a cord, how many cords of wood may be bought for 853 dollars?

23. At 17 cents per lb., how many pounds of chocolate may be bought for \$1.00? How many lb. for \$2.00? How many lb. for \$8.87?

24. At 25 dollars per cwt. what part of 1 cwt. of cocoa may be bought for 1 dollar? What part for 3 dollars? What part for 8 dollars? What part for 18 dollars? How many cwt. may be bought for 2,387 dollars?

25. At 28 dollars per ton, how many tons of hay may be bought for \$427?

26. If 32 dollars will buy 1 thousand of staves, what part of a thousand may be bought for 1 dollar? What part of a thousand may be bought for 2 dollars? What part of a thousand may be bought for 7 dollars? What part for 15 dollars? What part for 27 dollars? How many thousands may be bought for 87 dollars? How many for \$853?

27. At 45 cents per gallon, what part of a gallon may be bought for 1 cent? What part for 3 cents? What part for 8 cents? What part for 17 cents? What part for 37 cents? What part for 42 cents? How many gallons may be bought for \$17.53?

28. At 138 dollars per ton, what part of a ton of potash may be bought for 1 dollar? What part for 17 dollars? What part for 35 dollars? What part for 87 dollars? What part for 115 dollars? How many tons may be bought for \$875? How many tons for \$27,484?

29. At \$6.75 per barrel, what part of a barrel of flour may be bought for 1 cent? What part for 17 cents? What part for 87 cents? What part for \$2.87? How many barrels may be bought for \$73.25?

30. At 73 cents a gallon, how many gallons of wine may be bought for \$35.00?

31. At \$2.75 per cwt., how many cwt. of fish may be bought for \$93.67?

32. If a ship sail at the rate of 132 miles in a day, in how many days will she sail 3,000 miles?

33. If a ship sail at the rate of 125 miles per day, how long will it take her to sail round the world, it being about 24,911 miles?

34. How much indigo, at 2 dollars per lb., must be given for 19 yds. of broadcloth, at 7 dollars per yard?

35. How many bushels of corn, at 5s. per bushel, must be given for 23 bushels of wheat, at 7s. per bushel?

36. How many lb. of butter, at 23 cents per lb. must be given for 5 quintals of fish, worth \$2.25 per quintal?

37. How many bushels of potatoes, at 3s. per bushel, must be given for a barrel of flour, worth 7 dollars and 4 shillings?

38. At 2£. 3s. per barrel, how many shillings will 7 barrels of flour come to? How much brandy, at 8s. per gal., will it take to pay for it?

39. If 63 gallons of water, in 1 hour, run into a cistern containing 423 gallons, in what time will it be filled?

40. At 4s. 3d. per bushel, what part of a bushel will 1d. buy? What part of a bushel will 8d. buy? What part of a bushel will 1s. or 12d. buy? How many bushels may be bought for 2£. 16s. 4d.?

41. At 6s. 4d. per gallon, how many gallons of wine may be bought for 17£. 3s. 8d.?

42. At 11s. 6d. per gallon, how many gallons of brandy may be bought for 43£.?

43. A buys of B 3 cwt. 3 qrs. of sugar, at 9 cents per lb.; 2 hhd. of brandy at \$1.57 per gallon; and 8 qqls. of fish at \$2.55 per qql. In return, B pays A \$25.00 in cash; 150 lb. of bees-wax, at \$0.40 per lb.; and the rest in flour at \$7.50 per barrel. How many barrels of flour must B give A?

44. 785 are how many times 4?

45. 2,873 are how many times 8?

46. 8,467 are how many times 9?

47. 2,864 are how many times 14?

48. 43,657 are how many times 28?

49. 27,647 are how many times 78?

50. 884,673 are how many times 153?

51. 181,700 are how many times 437?

52. 984,607 are how many times 2,467?

53. Divide 1,708,540 by 13,841.

54. Divide 407,648,205 by 403,006.

55. Divide 100,000,000 by 12,478.

XI. B At 10 cents per lb., how many lb. of beef may be bought for \$0.87?

2. At 10 cents per lb. how many lb. of cheese may be bought for \$3.54?

3. At 10d. per lb. how many lb. of raisins may be bought for 13s. 4d.?

4. Suppose you had 243 lb. of candles, which you wished to put into boxes containing 10 lb. each; how many boxes would they fill?

5. At 10 dollars a chaldron, how many chaldrons of coal may be bought for 749 dollars?

6. At \$1.00 per bushel, how many bushels of corn can you buy for \$43.73?

7. If you had 32,487 oranges, which you wished to put into boxes containing 100 each, how many boxes could you fill?

8. At \$1.00 per lb. how many lb. of hyson tea may be bought for \$243.84 ?

9. At \$10.00 per bbl. how many barrels of pork may be bought for \$247.63 ?

10. At \$100.00 per ton, how many tons of iron may be bought for \$8,734.87 ?

11. In 78 how many times 10 ?

12. In 3,876 how many times 10 ?

13. In 473 how many times 100 ?

14. In 6,783 how many times 100 ?

15. In 48,768 how many times 100 ?

16. In 475,384 cents how many dollars ?

17. In 5,710,648 how many times 1,000 ?

18. In 1,764,874 mills how many cents ? How many dimes ? How many dollars ?

19. In 4,710,074 mills how many dollars ?

XCI. 1. What part of 5 lb. is 3 lb. ?

2. What part of 7 yards is 4 yards ?

3. What part of 7 yards is 10 yards ?

4. What part of 3 yards is 5 yards ?

5. What part of 4 oz. is 7 oz. ?

6. What part of 7d. is 10d. ?

7. What part of 17 cents is 9 cents ?

8. What part of 9 cents is 17 cents ?

9. What part of 35 dollars is 17 dollars ?

10. What part of 17 dollars is 35 dollars ?

11. 4 dollars is what part of 67 dollars ?

12. 67 dollars is what part of 4 dollars ?

13. What part of 103 rods is 17 rods ?

14. What part of 17 rods is 103 rods ?

15. What part of 256 miles is 39 miles ?

16. What part of 20 miles is 256 miles ?

17. What part of 287 inches is 138 inches ?

18. What part of 38,649 farthings is 8,473 farthings ?

19. What part of 907,384 is 3,906 ?

20. What part of 384 is 96,483 ?

21. What part of 1d. is 1 farthing ? What part of 1d. is 2 farthings ? 3 farthings ?

22. What part of 1s. is 1d. ? 2d. ? 3d. ? 4d. ? 5d. ? 6d. ? 7d. ? 11d. ?

23. What part of 1s. is 1 farthing ? 2 farthings ? 3 farthings ? 7 farthings ? 13 farthings ? 35 farthings ?

24. What part of 1s. is 1d. 3 qr. ? 2d. 1qr. ? 9d. 2qr. ?

Note. Reduce the pence to farthings.

25. What part of 1£. is 1 shilling ? 2 shillings ? 7 shillings ? 17 shillings ?

26. What part of 1£. is 1 penny ? 3 pence ? 7 pence ? 25 pence ? 87 pence ? 147 pence ?

27. What part of 1£. is 2s. 5d. ?

Note. Reduce the shillings to pence.

28. What part of 1£. is 7s. 4d. ?

29. What part of 1£. is 13s. 8d. ?

30. What part of 1£. is 18s. 11d. ?

31. How many farthings are there in 1£. ?

32. What part of 1£. is 1 farthing ? 3 farthings ? 7 farthings ? 18 farthings ? 53 farthings ? 137 farthings ? 487 farthings ?

33. What part of 1£. is 7d. 3qr. ?

34. What part of 1£. is 11d. 2 qr. ?

35. What part of 1£. is 4s. 7d. 1 qr. ?

Note. Reduce the shillings and pence to farthings.

36. What part of 1£. is 13s. 8d. 2qr. ?

37. What part of a gallon is 1 quart ?

38. What part of a gallon is 1 pint ?

39. What part of a gallon is 1 gill ?

40. What part of a gallon is 7 gills ?

41. What part of a gallon is 2 qts. 1 pt. 3 gls. ?

42. What part of 1 hhd. is 1 gallon ? 17 gallons ?

43. What part of 1 hhd. is 1 gill ? 43 gills ?

44. What part of 1 hhd. is 17 gals. 3 qts. 1 pt. 2 gills ?

45. What part of 1 qr. is 1 lb. ? 13 lb. ?

46. What part of 1 lb. is 1 oz. Avoirdupois ? 11 oz. ?

47. What part of 1 lb. is 1 dram ? 15 drams ?

48. What part of 1 lb. is 13 oz. 11 dr. ?

49. What part of 1 qr. is 1 dram ? 43 drams ?

50. What part of 1 qr. is 17 lb. 11 oz. 8 dr. ?

51. What part of 1 year is 1 calendar month ? 7 months ? 11 months ?

52. What part of a calendar month is 1 day ? 3 days ? 17 days ?

53. What part of 1 hour is 1 minute ? 17 minutes ?

54. What part of 1 day is 1 minute ? 13 minutes ?

55. What part of 1 day is 7 h. 43 min. ?

56. What part of 1 day is 1 second ? 73 seconds ? 258 seconds ?

57. What part of 1 day is 13 h. 43 min. 57 sec. ?

58. What part of a year is 1 second, allowing 365 days 6 hours to the year ? 8,724 seconds ?

59. What part of a year is 123 d. 17 h. 43 min. 25 sec. ?

60. What part of 8s. 3d. is 1 penny ? 8 pence ? 3s. 4d. ?

61. What part of 16s. 9d. is 5s. 3d. ?

62. What part of a dollar is 43 cents ?

63. What part of 5 dollars is 72 cents ?

64. What part of 3£. is 1 shilling ? 17 shillings ?

65. What part of 5£. is one penny ? 11 pence ? 4s. 8d. ?

66. What part of 4£. 7s. 8d. is 13s. 6d. ?

67. What part of 13£. 8s. 5d. is 3£. 7s. 6d. ?

68. What part of 3 yards is 1 quarter of a yard ?

69. What part of 16 yds. 1 qr. is 7 yds. 3 qrs. ?

70. What part of 13 yds. 3 qrs. 1 nl. is 4 yds. 3 qrs. 3 nls. ?

71. What part of 2 yds. 3 qrs. is 7 yds. 2 qrs. ?

72. What part of 3 days is 5 minutes ?

73. What part of 18 d. 3 h. is 13 d. 4 h. ?

74. What part of 5 d. 13 h. 18 min. is 26 d. 4 h. 7 min. ?

75. What part of 43 gals. 3 qts. 1 pt. is 27 gals. 2 qts. ?

76. What part of 17 gals. 1 qt. is 87 gals. 2 qts. ?

77. What part of 2 cwt. 1 qr. 17 lb. is 1 cwt. 3 qrs. 19 lb. ?

78. What is the ratio of 8 to 5 ?

79. What is the ratio of 5 to 8 ?

80. What is the ratio of 28 to 9 ?

81. What is the ratio of 9 to 28 ?

82. What is the ratio of 117 to 96 ?

83. What is the ratio of 57 to 294 ?

84. What is the ratio of 3,878 to 943 ?

XIII. 1.* If a family consume $\frac{1}{4}$ of a barrel of flour in a week, how many barrels will last them 4 weeks ? How many barrels will last them 17 weeks ?

2. If $\frac{1}{4}$ of a barrel of cider will serve a family 1 week, how many barrels will serve them 11 weeks ? How many barrels will serve them 28 weeks ?

3. In $\frac{1}{4}$ how many times 1 ? In $\frac{2}{3}$ how many times 1 ?

* See First Lessons, Sect. VIII. Art. B.

4. If $\frac{1}{13}$ of a chaldron of coals will supply a fire 1 day, how many chaldrons will supply it 57 days at that rate?

5. Reduce $\frac{47}{13}$ to a mixed number.

6. In $\frac{4}{7}$ of a bushel how many bushels?

7. Reduce $\frac{4}{7}$ to a mixed number.

8. In $\frac{387}{30}$ of 1£. how many pounds?

Note. This question is the same as the following.

9. In 387 shillings how many pounds?

10. In $\frac{437}{13}$ of a shilling how many shillings?

11. In 437 pence how many shillings?

12. In $\frac{134}{16}$ of a pound Avoirdupois, how many pounds?

13. In 134 oz. Avoirdupois how many pounds?

14. In $\frac{322}{21}$ of a guinea how many guineas?

15. In 322 shillings how many guineas, at 28 shillings each?

16. In $\frac{476}{24}$ of a day how many days?

17. In 476 hours how many days?

18. In $\frac{9737}{60}$ of an hour how many hours?

19. In 9,737 minutes how many hours?

20. In $\frac{43842}{365}$ of a year how many years?

21. In 43,842 days how many years, allowing 365 days to the year?

22. In $\frac{978468}{36525}$ of a year how many years?

23. Reduce $\frac{427}{5}$ to a mixed number.

24. Reduce $\frac{8753}{8}$ to a mixed number.

25. Reduce $\frac{3847}{784}$ to a mixed number.

26. Reduce $\frac{18006800}{24321}$ to a mixed number.

XIV. 1.* If $\frac{1}{4}$ of a cord of wood will supply two fires 1 day, how many days will a cord supply them? How many days will 3 cords supply them? How many days will 13 cords supply them?

2. How many 7ths are there in 1? How many 7ths are there in 3? How many in 13?

3. If $\frac{1}{8}$ of a barrel of beer will serve a family 1 day, how many days will 1 barrel serve them? How many days will $7\frac{1}{8}$ barrels serve them? How many days will $13\frac{3}{8}$ barrels serve them? How many days will $43\frac{5}{8}$ barrels serve them?

4. In 1 how many 8ths? In $7\frac{1}{8}$ how many 8ths? In $13\frac{3}{8}$ how many 8ths? In $43\frac{5}{8}$ how many 8ths?

5. If $\frac{1}{17}$ of a barrel of flour will serve a family 1 week,

* See First Lessons, Sect. VIII Art. A.

how many weeks will $2\frac{4}{7}$ barrels serve them? How many weeks will $13\frac{7}{17}$ serve them?

6. In $13\frac{7}{17}$ how many 15ths?

7. If $\frac{1}{37}$ of a barrel of flour will serve 1 man 1 day, how many men will $7\frac{3}{37}$ barrels serve? How many men will $43\frac{4}{37}$ barrels serve?

8. Reduce $7\frac{3}{37}$ to an improper fraction.

9. Reduce $43\frac{4}{37}$ to an improper fraction.

10. In $13\frac{4}{5}$ bushels how many $\frac{1}{5}$ of a bushel?

11. In $23\frac{4}{17}$ barrels how many $\frac{1}{17}$ of a barrel?

12. In $4\frac{4}{13}$ shillings how many $\frac{1}{13}$ of a shilling? That is, in 4s. 5d. how many pence?

13. In $8\frac{7}{10}$ £. how many $\frac{1}{10}$ of a pound? That is, in 8£. 7s. how many shillings?

14. In $15\frac{1}{2}$ days how many $\frac{1}{2}$ of a day?

15. In 15 d. 11 h. how many hours?

16. In $17\frac{4}{5}$ hours how many $\frac{1}{5}$ of an hour?

17. In 17 h. 43 min. how many minutes?

18. In $7\frac{3}{12}$ cwt. how many $\frac{1}{12}$ of 1 cwt.?

19. In 7 cwt. 37 lb. how many pounds?

20. In $18\frac{2}{37}$ cwt. how many $\frac{1}{37}$ of 1 cwt.?

21. In $237\frac{1}{17}$ how many $\frac{1}{17}$?

22. Reduce $437\frac{1}{17}$ to an improper fraction.

23. Reduce $63\frac{4}{17}$ to an improper fraction.

XV. 1.* Bought 7 yards of cotton cloth, at $\frac{3}{4}$ of a dollar per yard; how many dollars did it come to?

2. If a horse consume $\frac{3}{4}$ of a bushel of oats in 1 day, how many bushels will he consume in 15 days?

3. If a family consume $\frac{3}{4}$ of a barrel of flour in a week, how many barrels would they consume in 17 weeks?

4. If $\frac{7}{8}$ of a ton of hay will keep 1 cow through the winter, how many tons will keep 23 cows the same time?

5. If a pound of beeswax cost $\frac{7}{10}$ of a dollar, how many dollars will 7 lb. cost?

6. If 1 lb of chocolate cost $\frac{4}{17}$ of a dollar, what will 27 lb. cost?

7. If one lb. of candles cost $\frac{3}{10}$ of a dollar, what will 49 lb. cost?

8. At $\frac{7}{13}$ of a dollar a pound what cost 87 lb. of sheeting copper?

170. What is $\frac{2\frac{2}{3}}{7\frac{3}{4}}$ of 47 ?
171. Multiply $\frac{2\frac{2}{3}}{7\frac{3}{4}}$ by 7.
172. What is $\frac{3\frac{3}{4}}{6\frac{1}{2}}$ of 7 ?
173. Multiply 973 by $\frac{3\frac{3}{4}}{5\frac{5}{8}}$.
174. Multiply $\frac{3\frac{3}{4}}{5\frac{5}{8}}$ by 973.
175. Multiply 471 by $\frac{1\frac{1}{2}}{2\frac{2}{3}}$.
176. Multiply $\frac{1\frac{1}{2}}{2\frac{2}{3}}$ by 471.
177. Multiply $\frac{9\frac{9}{10}}{1000}$ by 138.
178. Multiply 138 by $\frac{9\frac{9}{10}}{1000}$.
179. Multiply $\frac{2\frac{2}{3}}{1303}$ by 950.
180. Multiply 950 by $\frac{2\frac{2}{3}}{1303}$.

XVII. 1. If 2 lb. of figs cost $\frac{2}{3}$ of a dollar, what is that a pound ?

2. If 2 bushels of potatoes cost $\frac{1}{4}$ of a dollar, what is that a bushel ? What would be the price of 8 bushels at that rate ?

If $\frac{2}{3}$ of a barrel of flour were to be divided equally among 3 men, how much would each have ?

If 3 horses consume $\frac{2}{7}$ of a ton of hay in 1 month, how much will 1 horse consume ? How much would 11 horses consume in the same time ?

5. If 7 lb. of beef cost $\frac{1}{2}$ of a dollar, what would a quarter of beef, weighing 26 lb., cost at that rate ?

6. If 2 yds. of cloth cost $\frac{1}{2}$ dollars, what will 7 yards cost at that rate ?

7. If 4 bushels of wheat cost 32 $\frac{1}{2}$ shillings, what will 17 bushels cost ?

8. If 3 sheep are worth 23 $\frac{1}{2}$ bushels of wheat, how many bushels is 1 sheep worth ? How many bushels are 50 sheep worth at that rate ?

9. Reduce 23 $\frac{1}{2}$ to fifths, or divide as far as you can, cost ? Then reduce the remainder to fifths, and take $\frac{1}{5}$ of

52. A man may be

53. If 7 calves are worth 59 $\frac{1}{2}$ bushels of corn, how many bushels are 15 calves worth at that rate ?

54. A man laboured 15 days for 20 $\frac{1}{2}$ dollars ; how much for 5 $\frac{1}{2}$ days in 3 months at that rate, allowing 26 working

55. A man travelled 88 $\frac{1}{11}$ miles in 17 hours ; how far did he travel in 1 hour ?

56. A man travelled 88 $\frac{1}{11}$ miles in 17 hours ; how far did he travel in 1 hour ?

57. A man travelled 88 $\frac{1}{11}$ miles in 17 hours ; how far did he travel in 1 hour ?

* See First Lessons, Sect. XIV.

35. If 3 bushels of wheat cost $5\frac{1}{2}$ dollars, what is it a bushel? What will 2 bushels cost at that rate?

36. What is $\frac{1}{3}$ of $5\frac{1}{2}$? What is $\frac{2}{3}$ of $5\frac{1}{2}$?

37. If 4 dollars will buy $5\frac{2}{3}$ bushels of rye, how much will one dollar buy? How much will 3 dollars buy?

38. What is $\frac{1}{4}$ of $5\frac{2}{3}$? What is $\frac{3}{4}$ of $5\frac{2}{3}$?

39. If 17 barrels of flour cost $\$107\frac{2}{3}$, what will 23 barrels cost?

40. What is $\frac{2}{3}$ of $107\frac{2}{3}$?

41. If 12 cwt. of sugar cost $\$137\frac{2}{3}$, what is the price of 1 qr.? What of 1 lb.?

42. At 4 dollars for $3\frac{1}{2}$ gallons of wine, how much may be bought for $67\frac{1}{2}$ dollars?

Note. Find how much $\frac{1}{2}$ a dollar will buy.

43. If 3 cords of wood cost 20 dollars, what will $7\frac{1}{2}$ cords cost?

44. If 19 yards of cloth cost 155 dollars, what will be the price of $1\frac{1}{4}$ yards?

45. If 18 lb. of raisins cost $2\frac{2}{3}$ dollars, what is that per lb.? What would be the price of $5\frac{2}{3}$ lb. at that rate?

46. If 11 lb. of butter cost $2\frac{3}{4}$ dollars, what will $18\frac{2}{3}$ lb. cost?

47. If 7 gallons of vinegar cost $\frac{2}{3}$ of a dollar, what will $27\frac{1}{2}$ gallons cost?

48. If 1 lb. of sugar cost $\frac{1}{4}$ of a dollar, what will $17\frac{2}{3}$ lb. cost?

49. If a yard of cloth cost $7\frac{3}{10}$ dollars, what will $\frac{2}{3}$ of a yard cost?

50. At $\frac{1}{2}$ of a dollar a yard, what will $\frac{2}{3}$ of a yard of cloth cost?

51. At $3\frac{2}{3}$ shillings a yard, what will $7\frac{2}{3}$ yards of riband cost?

52. At 3 dollars a barrel, what part of a barrel of cider may be bought for $\frac{1}{2}$ of a dollar?

53. At 4 dollars a yard, what part of a yard of cloth may be bought for $\frac{1}{2}$ of a dollar?

54. At 2 dollars a yard, how much cloth may be bought for $5\frac{1}{2}$ dollars?

55. At 2 dollars a gallon, how much brandy may be bought for $7\frac{2}{3}$ dollars?

56. At 3 shillings a quart, how many quarts of wine may be bought for $17\frac{2}{3}$ shillings?

57. At 6 dollars a barrel, how many barrels of flour may be bought for $45\frac{3}{4}$ dollars?

58. If 1 cwt. of iron cost $4\frac{1}{2}$ dollars, what will $5\frac{1}{2}$ cwt. cost?

59. A man failing in trade can pay only $\frac{2}{3}$ of a dollar on each dollar, how much can he pay on $7\frac{1}{2}$ dollars? How much on $23\frac{1}{2}$ dollars?

60. A man failing in trade is able to pay only $\frac{1}{2}$ of a pound on a pound, how much can he pay on 17£. 15s.?

61. A man failing in trade is able to pay only 17s. on a pound, what part of each pound will he pay? How much will he pay on a debt of 147£. 14s.?

62. What is $\frac{1}{3}$ of $\frac{2}{3}$?

63. Divide $\frac{2}{3}$ by 6.

64. Multiply $\frac{2}{3}$ by $\frac{1}{6}$.

65. What is $\frac{1}{3}$ of $\frac{1}{2}$?

66. Multiply $\frac{1}{3}$ by $\frac{1}{2}$.

67. Divide $\frac{1}{3}$ by 25.

68. Divide $15\frac{1}{2}$ by 8.

69. Multiply $15\frac{1}{2}$ by $\frac{1}{8}$.

70. What is $\frac{3}{4}$ of $17\frac{1}{2}$?

71. Multiply $13\frac{1}{2}$ by $\frac{1}{4}$.

72. Multiply $135\frac{1}{2}$ by $24\frac{1}{2}$.

73. Multiply $1,647\frac{1}{2}$ by $17\frac{1}{2}$.

74. How many times is 3 contained in $14\frac{1}{2}$?

75. How many times is 9 contained in $47\frac{1}{2}$?

76. How many times is 17 contained in $253\frac{1}{2}$?

77. What part of 2 is $\frac{3}{8}$?

78. What part of 7 is $\frac{1}{3}$?

79. What part of 19 is $\frac{2}{3}$?

80. What part of 123 is $\frac{1}{3}$?

81. What part of 8 is $7\frac{1}{3}$?

82. What part of 19 is $14\frac{1}{2}$?

83. What part of 82 is $19\frac{1}{2}$?

84. What part of 125 is $47\frac{1}{2}$?

XVIII. 1. If 1 lb. butter cost $\frac{1}{4}$ of a dollar, how much will 2 lb. cost? What will 4 lb. cost?

2. At $\frac{1}{4}$ of a dollar per lb., what will 2 lb. of raisins cost? What will 3 lb. cost? What will 6 lb. cost?

3. If 1 man will consume $\frac{1}{2}$ of a bushel of corn in a day, how much will 2 men consume in the same time?

much will 4 men consume? How much will 8 men consume?

4. If a horse will consume $\frac{4}{9}$ of a bushel of oats in a day, how much will he consume in 3 days? How much in 9 days?

5. If 1 man can do $\frac{1}{12}$ of a piece of work in a day, how much of it can 2 men do in the same time? How much of it can 3 men do? How much of it can 4 men do? How much of it can 6 men do? How much of it can 12 men do?

6. If a man drink $\frac{3}{10}$ of a barrel of cider in a week, how much would he drink in 2 weeks? How much would 5 men drink in a week at that rate? How much would 8 men drink in a week? How much would 20 men drink in a week? How much would 40 men drink in a week?

7. If a horse consume $2\frac{2}{3}$ bushels of oats in a week, how much would he consume in 4 weeks? How much in 8 weeks?

8. At $7\frac{3}{10}$ dollars a barrel, what cost 5 barrels of flour?

9. If a horse will eat $\frac{43}{248}$ of a ton of hay in a month, how much will 2 horses eat? How much will 8 horses eat?

10. If it take $1\frac{1}{2}$ yard of cloth to make a coat, how much will it take to make 8 coats? How much to make 24 coats?

11. If a barrel of cider cost $3\frac{27}{100}$ dollars, what will 10 barrels cost? What will 25 barrels cost?

12. Multiply $\frac{4}{25}$ by 5.

13. Multiply $\frac{3}{48}$ by 8.

14. Multiply $\frac{73}{125}$ by 25.

15. Multiply $\frac{37}{218}$ by 8.

16. Multiply $\frac{215}{881}$ by 9.

17. Multiply $\frac{217}{684}$ by 4.

18. Multiply $\frac{487}{1000}$ by 100.

19. Multiply $43\frac{27}{56}$ by 28.

20. Multiply $137\frac{19}{37}$ by 3.

21. Multiply $\frac{7}{8}$ by 8.

Note. 8 times $\frac{7}{8} = 7$; 8 times $\frac{7}{8}$ is 7 times as much, that

7. Perform the following examples in a similar manner.

How much is 7 times $\frac{4}{7}$?

How much is 19 times $\frac{15}{19}$?

How much is 23 times $\frac{11}{23}$?

Multiply $7\frac{3}{4}$ by 5.

Multiply $19\frac{4}{7}$ by 17.

Multiply $123\frac{1}{2}$ by 9.

Multiply $43\frac{11}{32}$ by 327.

ave.

12

that
much

29. Multiply $9\frac{5}{12}\frac{7}{8}$ by 1268.

30. Multiply $14\frac{9}{10}\frac{5}{100}$ by 1000.

XIX. 1.* A merchant bought 4 pieces of cloth, the first contained $18\frac{3}{5}$ yards, the second $27\frac{1}{2}$ yards, the third $23\frac{2}{3}$ yards, and the fourth $25\frac{2}{3}$ yards. How many yards in the whole?

2. A gentleman hired 2 men and a boy for 1 week. One man was to receive $5\frac{3}{5}$ dollars, the other $7\frac{5}{8}$, and the boy $3\frac{7}{8}$. How much did he pay the whole?

3. A gentleman hired three men for 1 month. To the first he paid $26\frac{3}{10}$ bushels of corn; to the second, $28\frac{7}{10}$ bushels, and to the third, $33\frac{9}{10}$ bushels. How many bushels did it take to pay them?

4. A man had $2\frac{1}{2}$ bushels of corn in one sack, and $2\frac{3}{4}$ in another; how many bushels had he in both?

5. If it takes $1\frac{1}{2}$ yard of cloth to make a coat, and $\frac{2}{3}$ of a yard to make a pair of pantaloons, how much will it take to make both?

6. A man bought 2 boxes of butter; one had $7\frac{3}{4}$ lb. in it, and the other $10\frac{3}{4}$ lb. How many pounds in both?

7. A boy having a pine apple, gave $\frac{1}{2}$ of it to one sister, $\frac{1}{3}$ to another, and $\frac{1}{6}$ to his brother, and kept the rest himself. How much did he keep himself?

8. A man bought 3 sheep; for the first he gave $6\frac{3}{4}$ dollars; for the second, $8\frac{5}{8}$; and for the third, $9\frac{1}{2}$. How many dollars did he give for the whole?

9. How many cwt. of cotton in four bags containing as follows; the first $4\frac{3}{4}$ cwt.; the second, $5\frac{3}{4}$ cwt.; the third $4\frac{8}{10}$ cwt.; and the fourth $7\frac{3}{20}$ cwt.?

10. A merchant bought a piece of cloth containing 29 yards, and sold $7\frac{3}{4}$ yards of it; how many yards had he left?

11. A gentleman paid a man and a boy for 2 months' labour with corn; to the man he gave $26\frac{3}{4}$ bushels, and to the boy he gave $18\frac{2}{3}$ bushels. How many bushels did it take to pay both?

12. Bought $8\frac{3}{4}$ cwt. of sugar at one time, and $5\frac{7}{8}$ cwt. at another; how much in the whole?

13. Bought $\frac{3}{4}$ of a ton of iron at one time, and $\frac{1}{4}$ of a ton at another; how much in the whole?

14. There is a pole standing so that $\frac{3}{4}$ of it is in the m

$\frac{2}{3}$ of it in the water, and the rest above the water ; how much of it is above the water ?

15. A merchant bought $14\frac{1}{3}$ cwt. of sugar, and sold $8\frac{5}{13}$ cwt. ; how many lb. had he left ?

Note. Reduce all fractions to their lowest terms, after the work is completed, or before if convenient. In the above example $\frac{5}{13}$ might be reduced, but it would not be convenient because it now has a common denominator with $\frac{1}{3}$. The answer may be reduced to lower terms.

16. Out of a barrel of cider there had leaked $7\frac{3}{4}$ gallons ; how many gallons were there left ?

17. A man bought 2 loads of hay, one contained $17\frac{3}{4}$ cwt. and the other $23\frac{4}{17}$ cwt. How many cwt. in both ?

18. A man had $43\frac{3}{4}$ cwt. of hay, and in 3 weeks his horse ate $5\frac{8}{17}$ cwt. of it ; how much had he left ?

19. Two boys talking of their ages, one said he was $9\frac{3}{4}$ years old ; the other said he was $4\frac{5}{11}$ years older. What was the age of the second ?

20. A lady being asked her age, said that her husband was $37\frac{5}{8}$ years old, and she was not so old as her husband by $8\frac{9}{13}$ years. What was her age ?

21. A lady being asked how much older her husband was than herself, answered, that she could not tell exactly ; but when she was married her husband was $28\frac{4}{17}$ years old, and she was $22\frac{4}{7}$. What was the difference of their ages ?

22. Add together $\frac{2}{7}$ and $\frac{4}{13}$.

23. Add together $\frac{2}{3}$, $\frac{2}{7}$, and $\frac{3}{4}$.

24. Add together $\frac{2}{13}$ and $\frac{4}{17}$.

25. Add together $13\frac{4}{13}$ and $17\frac{3}{10}$.

26. Add together $137\frac{2}{7}$, $26\frac{9}{13}$, and $243\frac{3}{7}$.

27. What is the difference between $\frac{3}{4}$ and $\frac{2}{7}$?

28. What is the difference between $\frac{4}{13}$ and $\frac{16}{17}$?

29. What is the difference between $13\frac{2}{13}$ and $8\frac{5}{11}$?

30. What is the difference between $137\frac{2}{7}$ and $98\frac{4}{7}$?

31. Subtract $38\frac{4}{13}$ from $53\frac{3}{11}$.

32. Subtract $284\frac{38}{173}$ from $813\frac{1}{4}$.

XX. 1. A man bought 15 cows for \$345. What was the average price ?

Ans. Find the price of 3 cows, and then of 1 cow.

123. merchant bought 16 yards of cloth for \$84.64 ; what
than theyard ?
much did 6 *

3. A merchant bought 18 barrels of flour for \$114.66, and sold it so as to gain \$1.00 a bbl. How much did he sell it for per barrel?

4. 21 men are to share equally a prize of 8,530 dollars, how much will they have apiece?

5. A merchant sold a hogshead of wine for 113 dollars. How much was it a gallon?

6. A ship's crew of 30 men are to share a prize of 847 dollars; how much will they receive apiece?

7. A man has 1,357 lb. of tobacco, which he wishes to put into 42 boxes, an equal quantity in each box. How much must he put into each box?

8. In 4,847 gallons of wine, how many hogsheads?

9. At \$48.00 a barrel, how many barrels of brandy may be bought for \$687.43?

10. At \$90 dollars a ton, how many tons of iron may be bought for 2,486 dollars?

11. If 23,000 cwt. of iron cost \$92,368.75, how much is it per lb.?

12. Divide 784 by 28.

13. Divide 1,008 by 36.

14. Divide 1,728 by 72.

15. Divide 2,352 by 56.

16. Divide 183 by 15.

17. Divide 487 by 18.

18. Divide 1,243 by 25.

19. Divide 37,864 by 63.

20. Divide 19,743 by 112.

21. Divide 4,383 by 30.

22. Divide 6,487 by 50.

23. Divide 1,673 by 400.

24. Divide 13,748 by 7,000.

25. Divide 100,789 by 250.

26. Divide 406,013 by 4,700.

27. Divide 3,000,406 by 306,000.

28. Divide 450,387 by 36,000.

29. Divide 78,407,300 by 42,000.

30. Divide 15,008,406 by 480,000.

XXI. 1. Find the divisors of each of the following numbers, 15, 18, 20, 21, 24, 28, 42, 48, 64, 72, 88, 98.

2. Find the divisors of each of the following numbers, 108, 112, 114, 120, 387, 432, 846, 936.

3. Find the divisors of each of the following numbers, 8000, 4,053, 1,864, 2,480, 24,876, 103,284, and 7,328,472.
4. Find the common divisors of 8 and 24.
5. Find the common divisors of 16 and 36
6. Find the common divisors of 18 and 42
7. Find the common divisors of 21 and 56.
8. Find the common divisors of 56 and 264.
9. Find the common divisors of 123 and 642.
10. Find the common divisors of 32, 96, and 1,432.
11. Find the common divisors of 7,362, and 2,484.
12. Find the common divisors of 73,647, 84,177, and 9,684.
13. Reduce $\frac{14}{2\frac{1}{2}}$ to its lowest terms.
14. Reduce $\frac{48}{300}$ to its lowest terms.
15. Reduce $\frac{300}{420}$ to its lowest terms.
16. Reduce $\frac{96}{480}$ to its lowest terms.
17. Reduce $\frac{486}{9720}$ to its lowest terms.
18. Reduce $\frac{4746}{38433}$ to its lowest terms.
19. Reduce $\frac{800}{42000}$ to its lowest terms.

XXII. 1. Reduce $\frac{3}{4}$ and $\frac{2}{3}$ to the least common denominator.

2. Reduce $\frac{3}{4}$ and $\frac{4}{18}$ to the least common denominator.

3. Reduce $\frac{5}{8}$ and $\frac{3}{8}$ to the least common denominator.

4. Reduce $\frac{2}{4}$ and $\frac{5}{14}$ to the least common denominator.

5. Reduce $\frac{5}{12}$ and $\frac{7}{18}$ to the least common denominator.

6. Find the least common multiple of 8 and 12.

7. Find the least common multiple of 8 and 14.

8. Find the least common multiple of 9 and 15.

9. Find the least common multiple of 15 and 18.

10. Find the least common multiple of 10, 14, and 15.

11. Find the least common multiple of 15, 24, and 35.

12. Find the least common multiple of 30, 48, and 56.

13. Find the least common multiple of 32, 72, and 120.

14. Find the least common multiple of 42, 60, and 125.

15. Find the least common multiple of 250, 180, and 540.

16. Reduce $\frac{5}{8}$ and $\frac{7}{28}$ to the least common denominator.

17. Reduce $\frac{7}{24}$ and $\frac{5}{34}$ to the least common denominator.

18. Reduce $\frac{17}{90}$ and $\frac{17}{90}$ to the least common denominator.

19. Reduce $\frac{17}{90}$ and $\frac{17}{90}$ to the least common denominator.

20. Reduce $\frac{17}{90}$ and $\frac{17}{90}$ to the least common denominator.

21. Reduce $\frac{17}{90}$ and $\frac{17}{90}$ to the least common denominator.

22. Reduce $\frac{17}{90}$ and $\frac{17}{90}$ to the least common denominator.

23. Reduce $\frac{17}{90}$ and $\frac{17}{90}$ to the least common denominator.

24. Reduce $\frac{17}{90}$ and $\frac{17}{90}$ to the least common denominator.

20. Reduce $\frac{4}{35}$, $\frac{3}{65}$, and $\frac{2}{15}$ to the least common denominator.

21. Reduce $\frac{13}{384}$ and $\frac{47}{648}$ to the least common denominator.

22. Reduce $\frac{35}{3800}$ and $\frac{43}{28000}$ to the least common denominator.

23. Reduce $\frac{115}{1236}$ and $\frac{840}{14400}$ to the least common denominator.

24. Reduce $\frac{174}{38800}$ and $\frac{38}{28000}$ to the least common denominator.

XXIII. 1.* At $\frac{1}{3}$ of a dollar a bushel, how many bushels of potatoes may be bought for 5 dollars? How many at $\frac{2}{3}$ of a dollar a bushel?

2. At $\frac{1}{5}$ of a shilling apiece, how many peaches may be bought for a dollar? How many at $\frac{2}{3}$ of a shilling apiece?

3. A gentleman distributed 6 bushels of corn among some labourers, giving them $\frac{1}{4}$ of a bushel apiece; how many did he give it to? How many would he have given it to, if he had given $\frac{3}{4}$ of a bushel apiece?

4. If it takes $\frac{5}{8}$ of a bushel of rye to sow 1 acre, how many acres will 15 bushels sow?

5. A merchant had 47 cwt. of tobacco which he wished to put into boxes, containing $\frac{7}{10}$ cwt. each. How many boxes must he get?

6. A gentleman has a hogshead of wine which he to put into bottles, containing $\frac{4}{15}$ of a gallon each. How many bottles will it take?

7. If $\frac{3}{10}$ of a barrel of cider will last a family 1 week, how many weeks will 7 barrels last?

8. If $\frac{7}{15}$ of a bushel of grain is sufficient for a family of two persons 1 day, how many days would 16 bushels last? How many persons would 16 bushels last 1 day?

9. If a labourer drink $\frac{13}{8}$ of a gallon of cider in a day with another, how long will it take him to drink a head?

10. If an axe-maker put $\frac{7}{10}$ of a lb. of steel into an axe, how many axes would 1 cwt. of steel be sufficient to make?

11. If it take $1\frac{1}{2}$ bushel of oats to sow an acre, how many acres will 18 bushels sow?

12. If it take $1\frac{1}{2}$ bushel of wheat to sow an acre, how many acres will 23 bushels sow?

* See First Lessons, Sect. XV

13. At $1\frac{3}{4}$ dollar a bushel, how much wheat may be bought for 20 dollars?

14. At $3\frac{1}{2}$ dollars a barrel, how many barrels of cider may be bought for 40 dollars?

15. At the rate of $15\frac{2}{3}$ bushels to the acre, how many acres will it take to produce 75 bushels of rye?

16. At $4\frac{3}{8}$ dollars per cwt., how many tons of iron can I buy for \$150?

17. At $11\frac{1}{2}$ cents per lb., how much steel can I buy for \$50.00?

18. If a man can perform a journey in 580 hours, how many days will it take him to perform it if he travel 9 hours in a day?

19. How many coats may be made of 187 yards of flour if $3\frac{4}{7}$ yards make 1 coat?

20. In 43 yards how many rods?

21. In 87 yards how many rods?

22. In 853 feet how many rods? cwt. of sugar

23. In 2,473 feet, how many furlongs for $3\frac{1}{2}$ dollars?

24. In 43,872 feet, how many part of a ton of iron may

25. If 1 bushel of apples cost $\frac{3}{4}$ dollar a bushel, what part of a bushels may be bought for $\frac{1}{2}$ of a dollar?

26. At $\frac{1}{2}$ of a dollar for $\frac{1}{2}$ of a dollar? may be bought for a barrel of flour, one gave $2\frac{1}{2}$ dollar?

27. At $\frac{2}{3}$ of the whole value did each pay? What may be bought should each have?

28. Two men hired a pasture for 21 dollars. One kept a horse in it $5\frac{1}{2}$ weeks, and the other $7\frac{1}{2}$ weeks; what should each to pay?

34. What part of $7\frac{1}{2}$ is $2\frac{1}{2}$?

What part of $53\frac{1}{2}$ is $13\frac{1}{2}$?

35. What part of $107\frac{1}{2}$ is $93\frac{1}{2}$?

would be a part of $3,840\frac{1}{2}$ is $\frac{4}{37}$?

36. What part of $\frac{2}{3}$ is $\frac{2}{7}$?

whole of $11\frac{1}{2}$ is $1\frac{1}{2}$?

37. A will of $28\frac{1}{2}$ is $13\frac{1}{2}$?

\$3,500. At the same rate $37\frac{1}{2}$ is $97\frac{1}{2}$?

27. At the same rate $\frac{2}{3}$ is $\frac{2}{13}$?

is first cost.

is second cost.

125. A merchant

than they cost, a

much did the goods

on of brandy cost \$0.75, what

as, Sect. VI. and XI.

ARITHMETIC.

Part 1.

20. Reduce $\frac{4}{15}$, $\frac{3}{15}$, and $\frac{2}{15}$ to the least common denominator.

21. Reduce $\frac{13}{144}$ and $\frac{47}{648}$ to the least common denominator.

22. Reduce $\frac{35}{3600}$ and $\frac{43}{18000}$ to the least common denominator.

23. Reduce $\frac{115}{1250}$ and $\frac{840}{14400}$ to the least common denominator.

24. Reduce $\frac{174}{8800}$ and $\frac{38}{18000}$ to the least common denominator.

XXIII. 1.* At $\frac{1}{3}$ of a dollar a bushel, how many bushels of potatoes may be bought for 5 dollars? How many at $\frac{2}{3}$ of a dollar a bushel?

2. At $\frac{1}{8}$ of a shilling apiece, how many peaches may be bought for a dollar? How many at $\frac{2}{3}$ of a shilling apiece?

3. A gentleman distributed 6 bushels of corn among some labourers, giving them $\frac{1}{4}$ of a bushel apiece; how many did he give it to? How many would he have given it to, if he had given $\frac{3}{4}$ of a bushel apiece?

4. If it takes $\frac{5}{8}$ of a bushel of rye to sow 1 acre, how many acres will 15 bushels sow?

5. A merchant had 47 cwt. of tobacco which he wished to put into boxes, containing $\frac{7}{10}$ cwt. each. How many must he get?

6. A gentleman has a hogshead of wine which he to put in bottles, containing $\frac{4}{15}$ of a gallon each. How many bottles will it take?

many barrels of cider will last a family 1 week?

How many bushels will last?

21. If $\frac{3}{4}$ of a yard of cloth cost 6 dollars, what cost $\frac{1}{4}$? What will a yard cost?

22. If $\frac{3}{8}$ of a gallon, that is 3 pints, of wine cost 90 cents, what will $\frac{1}{8}$, that is 1 pint, cost? What will a gallon cost?

23. If $\frac{5}{8}$ of a gallon of brandy cost 95 cents, what will $\frac{1}{8}$ cost? What will a gallon cost?

24. If $\frac{3}{4}$ of a yard of broadcloth cost \$6.00, what will $\frac{1}{4}$ cost? What will a yard cost?

25. If $\frac{1}{4}$ of a box of lemons cost \$2.40, what will $\frac{3}{4}$ cost? What will the whole box cost?

26. If $\frac{1}{2}$ of a hhd. of molasses cost \$16.00, what will the whole hogshead cost?

27. A man travelled 12 miles in $\frac{3}{10}$ of a day; how far did he travel in $\frac{1}{10}$ of a day? How far would he travel in a day at that rate?

28. A man bought $\frac{5}{7}$ of a barrel of flour for \$4.85, what would be the price of a barrel at that rate?

29. A man being asked his age answered, that he was 24 years old when he was married, and that he had lived with his wife $\frac{2}{3}$ of his whole life. What part of his whole age is 24 years? What was his age?

30. A smith bought $\frac{5}{8}$ of a ton of Russia iron for \$25.35, what would be the price of a ton at that rate?

31. Bought $\frac{2}{3}$ of a yard of cloth for \$5.00, what would be the price of a yard at that rate?

32. If $\frac{3}{8}$ of a gallon of molasses, that is, 3 pints, cost 17 cents, what will $\frac{1}{8}$ (1 pint,) cost? What will a gallon cost?

33. If $\frac{5}{16}$ of a pound of snuff, (5 ounces,) cost 14 cents, what cost $\frac{1}{16}$ lb., (1 ounce.)?

34. If $\frac{4}{13}$ of a chaldron of coal cost \$5, what cost $\frac{1}{13}$? What is that a chaldron?

35. A man travelled 4 miles in $\frac{2}{3}$ of an hour; how far would he travel in an hour at that rate?

36. If $\frac{3}{8}$ of a ship's cargo is worth \$14,000, what is the whole cargo worth?

37. A man is $\frac{4}{5}$ of what number, and his share is worth \$3,500. Divide them so, what number is worth?

38. Since 13 per cent, that is, what number is worth \$63,275, what is the cost?

39. If 11, what is a yard worth?

40. If 13 shillings, what is

125. A merchant sold a quantity of goods, and by doing so gained 13 shillings, what is the cost of the goods?

20. Reduce $\frac{4}{3}$, $\frac{3}{4}$, and $\frac{2}{15}$ to the least common denominator.

21. Reduce $\frac{13}{84}$ and $\frac{47}{648}$ to the least common denominator.

22. Reduce $\frac{35}{3800}$ and $\frac{43}{38000}$ to the least common denominator.

23. Reduce $\frac{115}{1230}$ and $\frac{840}{14400}$ to the least common denominator.

24. Reduce $\frac{174}{38800}$ and $\frac{38}{48000}$ to the least common denominator.

XXIII. 1.* At $\frac{1}{3}$ of a dollar a bushel, how many bushels of potatoes may be bought for 5 dollars? How many at $\frac{2}{3}$ of a dollar a bushel?

2. At $\frac{1}{4}$ of a shilling apiece, how many peaches may be bought for a dollar? How many at $\frac{2}{3}$ of a shilling apiece?

3. A gentleman distributed 6 bushels of corn among some labourers, giving them $\frac{1}{4}$ of a bushel apiece; how many did he give it to? How many would he have given it to, if he had given $\frac{2}{3}$ of a bushel apiece?

4. If it takes $\frac{2}{3}$ of a bushel of rye to sow 1 acre, how many acres will 15 bushels sow?

5. A merchant had 47 cwt. of tobacco which he wished to put into boxes, containing $\frac{7}{10}$ cwt. each. How many boxes must he get?

6. A gentleman has a hogshead of wine which he to put into bottles, containing $\frac{4}{5}$ of a gallon each. How many bottles will it take?

7. If $\frac{2}{3}$ of a barrel of cider will last a family 1 week, how many weeks will 7 barrels last?

8. If $\frac{7}{3}$ of a bushel of grain is sufficient for a family of two persons 1 day, how many days would 16 bushels last? How many persons would 16 bushels last 1 day?

9. If a labourer drink $\frac{1}{8}$ of a gallon of cider in a day with another, how long will it take him to drink 1 head?

10. If an axe-maker put $\frac{7}{10}$ of a lb. of steel into an axe, how many axes would 1 cwt. of steel be sufficient to make?

11. If it take $1\frac{1}{2}$ bushel of oats to sow an acre, how many acres will 18 bushels sow?

12. If it take $1\frac{1}{2}$ bushel of wheat to sow an acre, how many acres will 23 bushels sow?

* See First Lessons, Sect. XV

13. At $1\frac{1}{2}$ dollar a bushel, how much wheat may be bought for 20 dollars?

14. At $3\frac{1}{2}$ dollars a barrel, how many barrels of cider may be bought for 40 dollars?

15. At the rate of $15\frac{3}{4}$ bushels to the acre, how many acres will it take to produce 75 bushels of rye?

16. At $4\frac{3}{8}$ dollars per cwt., how many tons of iron can I buy for \$150?

17. At $11\frac{1}{2}$ cents per lb., how much steel can I buy for \$50.00?

18. If a man can perform a journey in 580 hours, how many days will it take him to perform it if he travel 9 hours in a day?

19. How many coats may be made of 187 yards of flour if $3\frac{1}{7}$ yards make 1 coat?

20. In 43 yards how many rods?

21. In 87 yards how many rods?

22. In 853 feet how many rods?

23. In 2,473 feet how many furlongs?

24. In 43,872 feet how many rods?

25. If 1 bushel of apples cost $\frac{3}{4}$ dollar a bushel, what part of a bushels may be bought for $\frac{1}{2}$ dollar?

26. At $\frac{1}{2}$ of a dollar a barrel of flour, one gave $2\frac{1}{2}$ dollars for flour, what part of a barrel of flour may be bought for $\frac{1}{2}$ dollar?

27. At $\frac{2}{3}$ of a dollar a barrel of flour, one gave $2\frac{1}{2}$ dollars for flour, what part of a barrel of flour may be bought for $\frac{1}{2}$ dollar?

28. Two men hired a pasture for 21 dollars. One kept a horse in it $5\frac{1}{2}$ weeks, and the other $7\frac{1}{2}$ weeks; what should each pay?

34. What part of $7\frac{1}{2}$ is $2\frac{1}{2}$?

What part of $53\frac{1}{2}$ is $13\frac{1}{2}$?

35. What part of $107\frac{1}{2}$ is $93\frac{1}{2}$?

What part of $3,840\frac{1}{2}$ is $4\frac{1}{2}$?

36. What part of $\frac{3}{4}$ is $\frac{1}{7}$?

What part of $11\frac{1}{2}$ is $1\frac{1}{2}$?

37. What part of $28\frac{1}{2}$ is $13\frac{1}{2}$?

What part of $37\frac{1}{2}$ is $9\frac{1}{2}$?

What part of $1\frac{1}{2}$ is $\frac{1}{3}$?

What part of $\frac{1}{2}$ is $\frac{1}{3}$?

What part of $\frac{1}{2}$ is $\frac{1}{3}$?

What part of $\frac{1}{2}$ is $\frac{1}{3}$?

What part of $\frac{1}{2}$ is $\frac{1}{3}$?

What part of $\frac{1}{2}$ is $\frac{1}{3}$?

What part of $\frac{1}{2}$ is $\frac{1}{3}$?

What part of $\frac{1}{2}$ is $\frac{1}{3}$?

on of brandy cost \$0.75, what

98. How many times is $\frac{5}{8}$ contained in $\frac{1}{2}$? what is it a bushel?

99. Divide 42 by $\frac{5}{8}$.

100. $3\frac{4}{5}$ is $\frac{5}{7}$ of what number? 97; what?

101. How many times is $\frac{5}{7}$ contained in 97?

102. Divide $3\frac{4}{5}$ by $\frac{5}{7}$.

103. $13\frac{2}{3}$ is $\frac{1}{9}$ of what number?

104. How many times is $2\frac{2}{3}$ or $\frac{1}{9}$ contained in $13\frac{2}{3}$?

105. Divide $13\frac{2}{3}$ by $2\frac{2}{3}$.

106. A merchant sold a quantity of goods for \$252.00, which was $\frac{2}{3}$ of what it cost him? How much did it cost him, and how much did he gain?

107. A merchant sold a quantity of goods for \$243.00, by which he gained $\frac{1}{3}$ of the first cost. What was the first cost, and how much did he gain?

Note. If he gained $\frac{1}{3}$ of the first cost, \$243.00 must be $\frac{2}{3}$ of the first cost.

108. A merchant sold a quantity of goods for \$3,846.00, by which bargain he gained $\frac{1}{3}$ of the first cost. What was the first cost, and how much did he gain?

109. A merchant sold a hhd. of wine for \$108.43, by which bargain he gained $\frac{1}{4}$ of the first cost. What was the first cost per gallon?

110. A merchant sold a bale of cloth for \$347.00, by which he gained $\frac{3}{10}$ of what it cost him? How much did it cost him, and how much did he gain?

Note. If he gained $\frac{3}{10}$ of the first cost, \$347.00 must be $\frac{7}{10}$ of the first cost.

111. A merchant sold a quantity of flour for \$147.00, by which he gained $\frac{2}{3}$ of the cost. How much did it cost, and how much did he gain?

112. A merchant sold a quantity of goods for \$6,487.00, by which he gained $\frac{7}{13}$ of the cost. How much did he gain?

113. A merchant sold a quantity of goods for \$187.00 by which he lost $\frac{1}{4}$ of the first cost. How much did it cost, and how much did he lose?

Note. If he lost $\frac{1}{4}$ of the cost, \$187.00 must be $\frac{3}{4}$ of the cost.

114. A merchant sold a quantity of goods for \$187.00, by which he lost $\frac{1}{4}$ of the cost. How much did he lose?

XXIV.

ARITHMETIC.

135. What sum of money put at interest at 6 will amount to \$394 in 1 year and 8 months?

136. What sum of money put at interest at 7 will amount to £183 in 1 year?

137. What sum of money put at interest at will amount to \$137 in 2 years and 6 months?

138. Suppose I owe a man \$287 to be paid in one without interest, and I wish to pay it now; how much ought I to pay him, when the usual rate is 6 per cent.?

Note. It is evident that I ought to pay him such a sum, as put at interest for 1 year will amount to \$287. The question therefore is like those above. This is sometimes called *discount*.

139. A man owes \$847 to be paid in 6 months without interest, what ought he to pay if he pays the debt now, at 10 per cent. money to be worth 6 per cent. a year?

Consequently, a merchant being in want of money sells a note of \$1000 due in 8 months without interest. How much

120. A merchant ought he to receive, when the yearly interest by which he gives is 6 per cent.?

cost, and how much according to the above principle, what is the difference?

121. A merchant sells the interest of \$100 for 1 year, at 6 per cent. which he gains out of it for the same time?

gain? is the difference between the interest of \$500

122. A merchant gives 13 per cent., and the discount of the same sum which he lost 12 per cent.?

and how much did he gain?

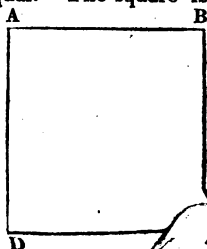
Note. If he lost 13 per cent. he sold it for $\frac{87}{100}$ of what it was worth. *scellaneous Examples.*

123. A merchant sold a quantity of goods, such as land, &c. a square is used which he lost 25 per cent. A square is a figure with four equal sides, and how much did he gain or angles equal. The square is

124. A merchant sold a quantity of goods, such as land, &c. a square is used which he lost 25 per cent. A square is a figure with four equal sides, and how much did he gain or angles equal. The square is

Note. Since 13 per cent. is $\frac{13}{100}$ of the first cost, the discount is $\frac{13}{100}$ of the first cost.

125. A merchant sold a quantity of goods, such as land, &c. a square is used which he lost 25 per cent. A square is a figure with four equal sides, and how much did he gain or angles equal. The square is



ARITHMETIC.

Part 1.

figure one inch long and one inch wide contains one square inch, how many square inches does a figure one inch wide and two inches long contain? How many square inches does a figure one inch wide and three inches long contain? Four inches long? Five inches long? Seven inches long?

2. In a figure 8 inches long and 1 inch wide, how many square inches? How many square inches does a figure 8 inches long and 2 inches wide contain? 3 inches wide? 4 inches wide? 5 inches wide? 8 inches wide?

3. If a figure 1 foot wide and 1 foot long contains 1 square foot, how many square feet does a figure 1 foot wide and 2 feet long contain? How many square feet does a figure 1 foot wide and 3 feet long contain? 5 feet long? 9 feet long? 15 feet long?

4. In a figure 9 feet long and 1 foot wide, how many square feet? How many square feet does a figure 9 feet long and 2 feet wide contain? 3 feet wide? 5 feet wide? 7 feet wide? 9 feet wide?

5. How many square inches does a figure 13 inches long and 1 inch wide contain? 2 inches wide? 3 inches wide? 8 inches wide?

6. How many square feet does a figure 16 feet long and 1 foot wide contain? 2 feet wide? 3 feet wide? 5 feet wide? 8 feet wide? 13 feet wide?

In the above examples supply yards, rods, furlongs, and miles, instead of inches and feet, and perform them again.

7. What rule can you make for finding the number of square inches, feet, yards, &c. in any rectangular figure?

Note. A figure with four sides, which has all its angles alike or right angles, is called a *rectangle*, and a rectangle is called a *square* when all the sides are equal.

8. How many square feet in a room 18 feet long and 13 feet wide?

9. How many square feet in a piece of land 143 feet long and 97 feet wide?

10. How many square rods in a piece of land 28 rods long and 7 rods wide?

11. A piece of land that is 20 rods long and 8 rods wide, or in any other form containing the same surface, is called an acre. How many square rods in an acre?

12. How wide must a piece of land be that is 17 rods long to make an acre ?

13. How many square inches in a square foot ; that is, in a figure that is 12 inches long and 12 wide ?

14. How much in length, that is 8 inches wide, will make a square foot ?

15. How many square feet in a square yard ?

16. How many square yards in a square rod ?

17. How many square inches in a square yard ?

18. A piece of land 20 rods long and 2 rods wide, or in any other form which contains the same surface, is called a rood. How many square rods in a rood ?

19. How many roods make an acre ?

20. Find the numbers for the following table.

SQUARE MEASURE.

4 144	square inches	make	1 square foot
9 4	square feet		1 square yard
36 160	square yards or		1 square rod,
57 768	square feet		perch, or pole
72 484	square rods		1 rood
4 160	roods		1 acre

21. How many square inches in a square rod ?

22. How many square yards in an acre ?

23. How many square inches in an acre ?

24. How many square feet in 1728 square inches ?

25. In 286 square poles how many acres ?

26. In 201,283,876 square inches, how many acres ?

27. How many square rods in a square mile ?

28. How many acres in a square miles ?

29. The whole surface of the globe is estimated at about 198,000,000 square miles. How many acres on the surface of the globe ?

30. How many square inches in a board 15 inches wide and 11 feet long ? How many square feet ?

31. How many acres in a piece of land 183 rods long and 9 rods wide ?

41. How many square inches in a yard of carpeting that is 36 in. wide ? How many yards of such carpeting will it take to cover a 9 ft. 4 in. long and 17 ft. 2 in. wide ?

To measure solid bodies, such as timber, wood, &c., it is necessary to use a measure that has three dimensions, length, breadth, and depth, height, or thickness. For this a measure is used in which all these dimensions are alike. Take a block, for example, and make it an inch long, an inch wide, and an inch thick, and all its corners or angles alike; this is called a *solid* or *cubic* inch; so a block made in the same way having each of its dimensions one foot, is called a *solid* or *cubic* foot.

33. If a block 1 inch wide and 1 inch thick and 1 inch long contains 1 solid inch, how many solid inches does such a block that is 2 inches long contain? 3 inches long? 4 inches long? 5 inches long? 8 inches long?

34. How many solid inches does a block that is 1 foot long, 1 inch thick, and 1 inch wide contain? How many inches does such a block that is 2 inches wide contain? 3 inches wide? 4 inches wide? 5 inches wide? 8 inches wide?

35. How many solid inches does a block 2 inches long, 2 inches wide, and 1 inch thick contain? 2 inches thick?

36. How many solid inches does a block 4 inches long, 3 inches wide, and 1 inch thick contain? 2 inches thick? 3 inches thick?

37. How many cubic inches in a block 10 inches long, 8 inches wide, and 1 inch thick? 2 inches thick? 3 inches thick? 5 inches thick? 7 inches thick?

38. How many cubic inches in a block 18 inches long, 13 inches wide, and 1 inch thick? 5 inches thick? 11 inches thick?

In the above examples supply feet instead of inches, and do them over again.

39. What rule can you make for finding the number of solid inches or feet in any regular solid body?

40. How many solid inches in a block 12 inches long, 12 inches wide, and 12 inches thick; that is, in a solid foot?

41. A pile of wood 8 feet long, 4 feet wide, & 4 feet high, or in any other form containing an equal quantity, is called a *cord* of wood. How many solid feet in a cord?

42. Find the numbers for the following table.

and 8 rods wide
surface, is called
e?

SOLID OR CUBIC MEASURE.

76 solid inches make 1 solid foot
 128 solid feet 1 cord of wood
 40 solid feet of round timber, or }
 48 solid feet of hewn timber } 1 ton or load

4. How many solid inches in a cord?
 fourth. How many solid inches in a ton of hewn timber?
 In 468,374 solid inches, how many solid feet?
 23. How many feet of timber in a stick 28 feet long and 11 inches square?

47. How many tons of timber in 2 sticks, each 25 feet long, 15 inches wide, and 11 inches thick?

48. A pile of wood 4 feet square and 1 foot long, or a pile containing 16 solid feet is called 1 *foot of wood*. How many such feet in a cord?

49. How many solid feet of wood in a pile 5 feet wide, 3 feet high, and 23 feet long? How many feet of wood? How many cords?

A few more examples of this kind will be found in decimals.

DECIMAL FRACTIONS.

XXV. In the following numbers, write the fractional part in the form of decimals.

1. Twenty-seven and six tenths, $27\frac{6}{10}$. *Ans.* 27.6.

2. Fourteen and seven hundredths, $14\frac{7}{100}$. *Ans.* 14.07.

3. One hundred twenty-three and eight thousandths, $123\frac{8}{1000}$. *Ans.* 123.008.

4. One hundred and eight, and five tenths, $108\frac{5}{10}$.

5. Three hundred and nine hundredths, $309\frac{9}{100}$.

6. Four thousandths, $4\frac{4}{1000}$.

7. Sixty-one thousandths, $61\frac{1}{1000}$.

8. One thousand, in 8 loads,

9. One hundred, in 17 barrels,

10. One hundred, of hay in 1 ton.

11. One hundred, per hundred.

12. One hundred, per hundred.

12. Three, and four tenths and two hundredths. $3\frac{4}{10} + \frac{2}{100}$
13. $\frac{4}{10}$ are how many hundredths?
14. $\frac{4}{10}$ and $\frac{2}{100}$ are how many hundredths?
15. $\frac{3}{10}$ are how many thousandths?
16. $\frac{3}{100}$ are how many thousandths?
17. $\frac{3}{10}$ and $\frac{8}{100}$ and $\frac{5}{1000}$ are how many thousandths?
18. Write $7\frac{385}{1000}$ in the form of a decimal.
19. $\frac{7}{10}$ are how many ten-thousandths?
20. $\frac{7}{100}$ are how many ten-thousandths?
21. $\frac{7}{1000}$ are how many ten-thousandths?
22. $\frac{7}{10}$, $\frac{7}{100}$, $\frac{7}{1000}$, and $\frac{7}{10000}$ are how many ten-thousandths?

23. Write $\frac{2567}{10000}$ in the form of a decimal?

Write the fractions in the following numbers in the form of decimals.

24. $13\frac{23}{100}$

25. $21\frac{182}{1000}$

26. $12\frac{5736}{100000}$

27. $142\frac{38746}{1000000}$

28. $1\frac{43}{1000}$

29. $17\frac{573}{10000}$

30. $193\frac{47}{100000}$

31. $87\frac{106}{1000000}$

32. $95\frac{406}{10000}$

33. $98\frac{6004}{10000000}$

34. $\frac{30507}{1000000}$

35. $\frac{807}{100000}$

Change the decimals in the following numbers to common fractions and reduce them to their lowest terms.

36. 42.5.

37. 84.25.

38. 9.8.

39. 137.16.

40. 25.125.

41. 18.625.

42. 11.8642.

43. 163.90064.

44. 72.0065.

45. 4.00025.

46. 13.006005

47. 0.75.

48. 0.3125.

49. .075.

50. .00128.

51. .00215.

52. .000010

53. .1

XXVI. 1. A man purchased a barrel of One hundred 87.43 ;
5 gallons of molasses for \$1.625, a barrel of Seventy-three, 12
\$4.87; 4 gallons of brandy for \$12.12, and a barrel of Sixty, 12
\$0.95; and 3 gallons of vinegar 4 feet 14 inches, and 12 feet 12
whole amount to ?

2. How many bushels of any solid feet
ing $2\frac{3}{10}$ bushels; the second following
the fourth, $4\frac{287}{1000}$?

Note. Write the

3. A man bought four loads of hay, the first containing $17\frac{3}{4}$ cwt.; the second, $19\frac{1}{4}$ cwt.; the third, $24\frac{1}{4}$ cwt.; and the fourth, $14\frac{1}{2}$ cwt. How many cwt. in the whole?

Note. In all the examples under the head of decimals, change the fractions and parts to decimals.

4. A man raised wheat in five fields, in the first, $47\frac{3}{10}$ bushels; in the second, $94\frac{9}{10}$; in the third, $87\frac{1}{10}$; in the fourth, $143\frac{1}{10}$; and in the fifth 387 bushels. How many bushels in the whole?

5. A man bought a load of hay for $6\frac{1}{10}$ £.; a load of oats for $7\frac{1}{10}$ £.; 3 bushels of corn for $\frac{1}{10}$ £.; and a load of wood for $2\frac{9}{10}$ £. How much did the whole come to?

6. Add together the following numbers, $38\frac{1}{10}$; $1386\frac{3}{10}$; 7006 ; $\frac{9}{10}$; $\frac{406}{10}$; 8 ; and $460\frac{3}{10}$.

7. From a piece of cloth containing $47\frac{3}{4}$ yards, a merchant sold $23\frac{1}{4}$. How much remained unsold?

8. A man owing \$253 paid \$187.375, how much did he then owe?

9. A man owing $342\frac{4}{10}$ £. paid $187\frac{1}{10}$ £. How much did he then owe?

10. A merchant bought a barrel of flour for $2\frac{1}{10}$ £.; 5 gallons of molasses for $\frac{1}{10}$ £.; and 6 gallons of wine for $2\frac{1}{10}$ £. In paying he multiplied a load of wood worth $2\frac{1}{10}$ £. and 2 bushels of wheat for $\frac{1}{10}$ £. and the rest in money; how much money did he then owe?

11. From a piece of cloth containing $87\frac{3}{4}$ yards.

12. From a piece of cloth containing 48.25 yards.

13. From a piece of cloth containing $684\frac{1}{10}$ lb.

14. From a piece of cloth containing $28\frac{9}{10}$ tons.

Note. 5 cwt.

1. At \$25 per cwt.

Application of Decimals.

XX *Note.* The quantity bought 5 barrels of pork, at \$17.43 per barrel, common fractions, how much did it come to?

28 lb., that is 11 yards of cloth, at \$7.875 per yard?

3 cwt. 3 qrs. 14 lb. bushels of meal in 14 sacks, containing

43.25 gives \$946.87

40. What cost 5 tons in 8 loads, containing 24.35 cwt. each? per cwt.?

41. What cost 1 ton in 17 bales, containing $4\frac{3}{4}$ cwt. each? per hhd.?